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EXPERIMENT STATION RECORD.

VOL. XXI. JULY, 1909. No. 1.

The first feeling at the retirement of a man who has long been an active and efficient worker, and has stood high in the counsels of his colleagues, is one of inevitable regret at the loss it suggests. This is especially so in the case of Dr. E. W. Hilgard, who has been so prominently identified with college and station work in agriculture since its pioneer days. Assuming the grade of emeritus several years ago, he now retires under the provisions of the Carnegie Foundation at the age of seventy-six, but in full vigor of mind and body.

While this step marks the official close of a long career of remarkable service to agriculture, it will not be taken by those who know him as terminating his activity. It means a freedom from wearing details, and a larger opportunity for the closing years of life.

Dr. Hilgard stands out as one of the foremost pioneers in agricultural science and in the experiment station movement. He entered that field when the workers could almost be counted on the fingers of one hand, and he brought to it a training which was broad and thorough. His scientific grasp of the problems presented made him effective and resourceful in attacking them. His success in that line helped to make it clear how science could be of service to the practice of agriculture and furnish a basis for its teaching. Among the very first of the experiment station directors in this country, his writings and influence were potent factors in the extension of these institutions to other States, and the ultimate establishment of a National system of stations under Federal aid.

The high quality of his work has given it very great value in constructing a science of agriculture. Its nature has been such that the benefits have not been confined to California, but the whole western empire, and in large measure the entire country has shared. However local an undertaking might be, his studies upon it have been fundamental, and this has lent to the results a National and in many cases a world-wide scope.

There is much of inspiration in his long and fruitful career, for the younger workers in agricultural science. The standards he set for thoroughness, accuracy, and scientific deduction are among the greatest assets of his life work. The tangible product of his labors can be

judged from the list of his investigations and their applications, but the influence of such a man on an embryo science and on the development of investigation is not easily measured.

Dr. Hilgard's versatility is one of the striking characteristics of his career. He has won distinction in two quite separate branches of science—chemistry and geology; and in agriculture he has covered an unusually wide field. His breadth of view, his liberal training, and his varied experience have fitted him to successfully head the work of an agricultural survey, to conduct a survey of the geological resources of a State, and to direct a census report on cotton production, besides conducting a series of soil investigations which has ranked him among the foremost authorities on that subject.

Starting as chemist of the recently established Smithsonian Institution in Washington in 1855, he soon went to Mississippi to take up work in geology, and from 1858 to 1872 was in charge of the geological survey in that State. His early years of study were devoted especially to geology, and his publications were mainly along that line. In 1860 he issued a nearly four hundred page report on The Geology and Agriculture of the State of Mississippi, which was followed by a series of special articles on geological subjects pertaining especially to Mississippi and Louisiana. His geological papers continued to appear down to about 1886. Several were printed in the U. S. Geological Survey reports on the Mineral Resources of the United States; and during that period he conducted investigations for the Mississippi River Commission, which were published in 1883.

In 1870 Dr. Hilgard began writing upon the maintenance of fertility in soils, and a few years later articles from his pen appeared on soil analyses and their utility, the interpretation of soil analysis, silt analyses of soils, and similar subjects, which were the beginning of his investigation in that field. He went to California in 1875 from the University of Michigan, where he had for two years occupied the chair of geology and natural history. His survey of the soils of the State began with his taking up work in California, and constituted the first comprehensive soil survey in this country. He was an earnest advocate of the direct chemical and physical investigation of soils, and their relations to native vegetation, for both theoretical and practical purposes. His study of both arid and humid soils gave a wider basis for a soil science, and corrected many erroneous conclusions drawn from experience in western Europe and humid regions.

His reputation rests especially on his study of the soils of regions deficient in rainfall. His investigations in that line have been extensive and long continued. They have brought out the contrast between the average composition of these arid soils and those of humid regions, and developed the important fact of the lower content of humus in

arid soils but its higher percentage in nitrogen. He first called attention to the relation of native vegetation to the character of the soil, and emphasized this relation as a means of judging of the qualities and adaptation of soils. He laid much stress on this as a supplement to physical-chemical analysis. His argument is briefly stated as follows: "The native vegetation represents, within the climatic limits of the regional flora, the results of a secular process of adaptation of plants to climates and soils, by natural selection and the survival of the fittest. The natural floras and sylvas are thus the expression of secular, or rather millennial experience, which if rightly interpreted must convey to the cultivator of the soil the same information that otherwise he must acquire by long and costly personal experience."

Dr. Hilgard's investigations on the alkali soils of the Pacific Slope were the first systematic studies in that line, and aided in clearing up the problems of reclamation of similar lands in Hungary, Africa, India, and Australia. He was a pioneer in that field, and has probably done more than any other one man to determine the nature of alkali, its effect on soils and plants, and the means of overcoming it. How progressive he was in his ideas is shown by a summary of his findings, published in 1886, on Alkali Lands, Irrigation and Drainage, and Their Mutual Relations. He there prescribed three methods for the reclamation of alkali lands, namely: (1) Frequent and deep tillage to maintain a deep soil mulch, both for preventing evaporation and keeping down the alkali; (2) leaching out by flooding and underdraining, and (3) the use of chemical antidotes, notably gypsum in the case of black alkali.

He also studied the resistance of various crops to alkali, both as a means of cultivating such lands and of removing the alkali. For several years he maintained an experiment station at Tulare for the study of alkali problems on a practical scale.

Dr. Hilgard was in charge of the agricultural division of the Northern Transcontinental Survey, 1881–1883, and in 1882 was made chairman of a commission appointed by the U. S. Commissioner of Agriculture on the agriculture of the arid regions. In the latter capacity he edited a report on the Climatic and Agricultural Features and the Agricultural Practice and Needs of the Arid Regions of the Pacific Slope. His treatise on The Relations of Soil to Climate, first published by this Department in 1892, was republished in enlarged and revised form in both France and Germany. In connection with the Tenth Census he prepared the report on cotton production, which contained an extensive study and discussion of the soils of the cotton-growing States. This work was at the time the most comprehensive soil study which had been made for a stated agricultural area, and has remained one of the most important sources of information. The

results of his studies, extending over a period of more than thirty years, have been brought together in a volume on Soils, which was issued in 1906.

In 1891 Dr. Hilgard associated with himself Dr. R. H. Loughridge, a former student, and an associate in the geological survey of Mississippi and in the census report on cotton production. This partnership has been continued to the present time. As assistant in agricultural chemistry and agricultural geology, Dr. Loughridge has had an important part in the investigations carried on in recent years, and his ability has enabled the work to be carried forward at times when Dr. Hilgard's health permitted little more than advisory participation in it.

These two men, so intimately associated in investigation for eighteen years, retired together at the close of the present academic year. While they will not engage in instruction, the courtesies of the laboratory will be extended to them; and with the added time at their disposal, it is hoped that agriculture may continue to profit by the fruits of their investigation and deliberation, and by their wide and ripe experience.

President Hadley, of Yale, has made an examination of the facilities for study and research in the various departments of the Government at Washington, and has reported the results in a bulletin of the Bureau of Education. In view of the consideration given to this matter at various times, especially by the Association of American Agricultural Colleges and Experiment Stations, President Hadley's findings are particularly interesting, as they touch upon important principles which must be recognized.

In stating the purpose of the inquiry the writer says that there has been a feeling in many quarters that the Government bureaus were not administered in such a way as to have the maximum educational value, that the work has not been done by students but by officials, and that its great scientific and administrative usefulness has emphasized the lack of direct connection with the educational system of the country. "It has been felt that if a larger number of students were trained in the Government offices at Washington, this would form a natural development and culmination of our whole system of public instruction."

Following a critical examination of the facilities for study and research afforded by the libraries, museums, and various Government laboratories at Washington, Dr. Hadley considers the class of students who desire to avail themselves of these facilities. He finds they fall into two quite distinct groups: "(1) Investigators of mature age and independent resources, who have definite problems to solve for which the departments in Washington furnish more suitable

or more accessible material than is to be found elsewhere. (2) Students not yet wholly established in their profession, who desire not only material for study, but also a certain amount of guidance and help from their superiors, and who wish to use their studies as a means of winning position for themselves as well as knowledge for the world."

Those of the first class he believes could be accommodated, as the number is evidently small and men of such ability and definite purpose would be welcomed. The second class is the one which people have generally had in mind, and their case is quite different. "They can not as a rule take care of themselves. They want suggestions concerning the ends to be pursued, no less than concerning the means to be employed. They are men who need education instead of simply needing opportunity." With respect to their real needs it is felt that the facilities at present afforded are not as great as they have been thought to be.

The obstacles to student work in the Government departments are presented by Dr. Hadley under three heads: The space difficulty, the administrative difficulty, and the educational difficulty. The generally crowded condition of the Government departments is apparent to anyone at all familiar with the subject, and the view is expressed that this difficulty is likely to continue. "There is a tendency on the part of every large Government undertaking to outgrow its quarters. Give it more room, and it will undertake more objects. This sort of vitality is the very best thing to have in a Government bureau, but it makes it harder for the officials in charge to find room for students."

The administrative difficulty turns upon the lack of funds and the advantage of trained *v.* untrained men. The bureau chiefs are under the necessity of studying ways and means quite carefully. They are anxious to accomplish as much as they can with the money placed at their disposal. The presence of students interferes with the chance of obtaining this maximum of efficiency, for "the labor of student assistants is, as a rule, neither very efficient nor very easy to handle." It is explained that under certain conditions the bureaus must of necessity train men for their work, and that under such circumstances the expenditure of money and time involved in their training is a necessary means to an end. "But where the educational object is an independent one—where it is not undertaken as a necessary preliminary to getting the work done, but as a means of outside public service in connection with the work that is already progressing—then it represents a costly diversion of time, strength and money. . . .

"In the majority of cases the educational work is no integral part of the administrative work. If one side must be sacrificed, it is the educational side. This is necessary and right. The main work of

our offices is and must be administrative. A bureau chief who should neglect his main work for the sake of a subsidiary or incidental one would be forfeiting his trust. If, under these circumstances, Congress wishes the bureaus to undertake educational work on a large scale, it ought to make a specific appropriation for the purpose. But it does not seem likely that this policy will be adopted."

Coming to the educational difficulty, Dr. Hadley states frankly that "even if we had room enough and appropriations enough, it is doubtful whether the Government bureaus, regarded from the purely educational standpoint, furnish as advantageous a training place as many people suppose." He holds that "to nine men out of ten a good school is a better training place in the theory of a man's profession than any ordinary office or bureau." He shows that we have passed beyond the stage of the student assistant, the stage in which the man who wished to be a lawyer went into a lawyer's office or the prospective engineer began by carrying chain for an engineer.

"A teacher who makes it his business to educate can do this side of the work more effectively than a practitioner, with whom the training of his assistants is and can be only an incidental matter. It is simply an instance of the advantages of division of labor. It is better to have a trained teacher do the teaching in places arranged for teaching, and a trained administrator do the business in the places arranged for business, than to try to mix the two things up. While this is not an absolutely universal rule, it holds true in the vast majority of cases."

Those who are familiar with the work of the Government will agree in general with Dr. Hadley's findings. The pressure upon the administrative officers for results is heavy, and in most departments the problems have grown too complex to make it possible to use untrained men to advantage. The experience which has been had in attempting to combine educational work with the administrative functions of the Government, without making special provision for it by way of relief from certain service or the provision of additional assistance, has not been encouraging. The difficulties of this dual service have been expressed in another way in the cases of men in the Government service who have given regular instruction at local educational institutions. In such instances it has been found desirable, in the interest of the Government's business, to place some limitations on this outside service.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY.

Thermo-chemistry, J. THOMSEN, trans. by KATHARINE A. BURKE (*London and New York, 1908, pp. XV+495, figs. 8*).—In the introduction the author considers the object of thermochemical research, formulas, symbols, and principles, and outlines experimental methods. The volume is then divided into four parts, the formation and properties of aqueous solutions, compounds of nonmetals, compounds of metals with nonmetals, and organic substances. Special interest attaches to the last section, in which the heat of combustion of volatile organic substances is one of the principal subjects considered. As a whole, the volume summarizes the author's investigations and results on thermochemistry. The research was undertaken, as is pointed out in the preface of the volume, to study in as systematic and complete a manner as possible "the investigation of the heat phenomena of the more important chemical reactions, and by the interpretation of these results to gain some further knowledge as to the real nature of chemical processes."

New gravimetric methods, P. JANNASCH (*Verhandl. Naturhist. Med. Ver. Heidelberg, n. scr., 9 (1908), No. 1, pp. 74–86, figs. 2*).—Methods are described for the indirect determination of carbon dioxid and nitric acid in nitrates by means of sodium tungstate fusion; the gravimetric determination of carbon dioxid by expulsion with concentrated sulphuric acid and collection of the gas in soda-lime absorbers; and the quantitative volatilization of arsenic from solutions by means of hydrochloric acid and hydrazin sulphate.

A simple method for the determination of nitrate and nitrite nitrogen in mixtures and in the presence of organic substances, T. ZELLER (*Landw. Vers. Stat., 70 (1909), No. 1–2, pp. 145–154; abs. in Chem. Ztg., 33 (1909), No. 26, Repert., p. 121; Analyst, 34 (1909), No. 398, pp. 241, 242*).—The author states that when a solution containing nitrite is boiled with ammonium chlorid solution of known strength and afterwards distilled with caustic magnesia the amount of ammonia thus obtained corresponds to the nitrite nitrogen in the original solution.

The method proposed for examination of solutions containing mixtures of nitrate, nitrite, and organic matter is as follows: Boil the solution to be tested with a measured amount of ammonium chlorid solution of known strength in a 100 cc. flask until it is reduced to a small volume, about 2 cc., fill to the mark with water and distill 40 cc. of the solution with caustic magnesia. Digest another 40 cc. of the solution with sulphuric acid and iron and distill with caustic soda. The difference between the amount of nitrogen so obtained and that found in the first determination corresponds to the nitrate nitrogen. Any ammonia which may have been in the solution originally should be determined in a separate portion of the solution by distillation with magnesia.

A nitrometer provided with means for correcting the barometric pressure, HERMAN (*Bull. Soc. Chim. Belg., 22 (1908), No. 12, pp. 440–444, fig. 1;*

abs. in Analyst, 34 (1909), No. 395, p. 75, fig. 1; Ann. Chim. Analyt., 14 (1909), No. 3, pp. 109–111, fig. 1; Jour. Chem. Soc. [London], 96 (1909), No. 556, II, pp. 181, 182, fig. 1; Chem. Zentbl., 1909, I, No. 6, p. 418).

The determination of caustic lime in presence of carbonate of lime. HEYER (*Chem. Ztg., 33 (1909), No. 12, pp. 102, 103; abs. in Ztschr. Angew. Chem., 22 (1909), No. 10, p. 449; Jour. Chem. Soc. [London], 96 (1909), No. 557, II, p. 267; Chem. Zentbl., 1909, I, No. 9, p. 789*).—The author describes an ammonium chlorid method which he has used successfully for several years for the determination of caustic lime, calcium hydroxid, and calcium saccharate, in presence of carbonate, sulphate, or phosphate of calcium. It is based upon the fact that calcium carbonate will not drive off ammonia from ammonium chlorid unless the solution is heated. The material to be tested is shaken up with 2 per cent ammonium chlorid solution and the resulting solution is titrated with tenth-normal acid.

Determination of small amounts of lime in presence of large amounts of magnesia, F. HUNDESHAGEN (*Ztschr. Öffentl. Chem., 15 (1909), No. 5, pp. 85–93; abs. in Ztschr. Angew. Chem., 22 (1909), No. 18, p. 836; Analyst, 34 (1909), No. 398, pp. 240, 241*).—The essential features of the method proposed for the separation of calcium and magnesium are to dissolve 1 gm. of the material by boiling 10 to 15 minutes in 80 cc. of 5 to 6 per cent hydrochloric acid, remove the insoluble residue by filtration, and evaporate to dryness on the water bath. Add 4 gm. of Glauber's salts and 30 cc. of warm water and mix with constant stirring with 40 cc. of 90 per cent alcohol. On standing from 4 to 5 hours the calcium sulphate crystallizes out and may be freed from magnesium salts by repeated decantation with 50 per cent alcohol.

The volumetric determination of phosphoric acid, monoalkali, and dialkali phosphates, J. M. WILKIE (*Jour. Soc. Chem. Indus., 28 (1909), No. 2, pp. 68, 69; abs. in Analyst, 34 (1909), No. 397, pp. 179, 180; Jour. Chem. Soc. [London], 96 (1909), No. 557, II, pp. 266, 267; Chem. Zentbl., 1909, I, No. 13, pp. 1114, 1115*).—The method proposed is based upon precipitation of the phosphoric acid as silver phosphate by means of silver nitrate in presence of excess of sodium acetate, then titrating directly the acetic acid set free with tenth-normal barium hydroxid in presence of phenolphthalein. The adaptation of the method to monoalkali and dialkali phosphates and its modification in presence of carbonates are explained.

The development of methods of analysis of Thomas slag, M. POPP (*Chem. Ztg., 33 (1909), Nos. 29, pp. 262, 263; 30, pp. 274, 275; 31, pp. 283, 284*).—The various methods proposed for this purpose are reviewed.

A practical modification of the method of determining hardness in water, F. TELLE (*Ann. Chim. Analyt., 13 (1908), No. 10, pp. 384–390; abs. in Ztschr. Angew. Chem., 22 (1909), No. 10, p. 449*).—The modification consists in using such proportions of reagents and solutions that the readings will give directly the amounts of calcium carbonate per liter.

The influence of chlorids on the determination of nitrates in water, G. PERRIER and L. FARCY (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 4, pp. 178–180; Ann. Chim. Analyt., 14 (1909), No. 6, pp. 213–215; abs. in Analyst, 34 (1909), No. 397, p. 174; Ztschr. Angew. Chem., 22 (1909), No. 16, p. 738; Chem. Zentbl., 1909, I, No. 13, p. 1114*).—In view of the error which the presence of chlorids causes in the determination of nitrates in water in the Grandval and Lajoux method, the author proposes a simple modification which consists of adding to the type sample used for comparison of colors a quantity of chlorin equal to that found to be present in the water examined.

Notes on the determination of nitrates by the Grandval and Lajoux method, M. LOMBARD and J. LAFORE (*Bul. Soc. Chim. France, 4. ser., 5 (1909),*

No. 7, pp. 321–323).—The authors, like Perrier and Farcy (see above), found that the presence of chlorin caused low results. This is attributed to the formation of aqua regia and the volatilization of some of the nitrogen of the nitrate.

[**Water-soluble material in soils**], A. E. Vinson and W. H. Ross (*Arizona Sta. Rpt. 1908, pp. 365, 366*).—Comparisons of various methods of extracting water-soluble matter from soils are reported, with results of analyses of the soluble constituents of 5 samples of soil. Digesting the soil for 10 hours on a water bath with shaking was found to be the quickest method of extraction.

Critical studies on humus acids: An improved method of determining the acid content of soils, H. Süchting (*Landw. Vers. Stat., 70 (1909), No. 1–2, pp. 13–52; abs. in Chem. Ztg., 33 (1909), No. 24, Repert., pp. 114, 115*).—A critical study of the original Tacke method and the author's modification of it (E. S. R., 9, p. 32; 19, p. 1009) is reported. The author shows that there is an inherent error in the Tacke method due to the continued evolution of carbon dioxid (even after 3 hours) resulting from the decomposition of the organic matter of the soil in the presence of calcium carbonate. Bacteria and other living organisms are not apparently concerned in this decomposition, and cooling to 0° C. did not lessen it.

Various methods based upon other principles are discussed and condemned. The author's new method, involving the determination of total acids, has been found satisfactory.

Should the determination of magnesia be omitted in the analysis of soils? O. Loew (*Chem. Ztg., 33 (1909), No. 14, pp. 118, 119; abs. in Ztschr. Angew. Chem., 22 (1909), No. 15, p. 687; Jour. Chem. Soc. [London], 96 (1909), No. 557, II, pp. 258, 259; Chem. Zentbl., 1909, I, No. 9, p. 788*).—The literature bearing upon the importance of magnesia as a constituent of soils, particularly in relation to lime, is briefly reviewed in this article, and the conclusion is drawn that it is highly important to know the relative proportions of lime and magnesia in soils.

Separation of iron and detection of the rare earths in cultivated soil, M. E. Pozzi-Escot (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 8, p. 694*).—The method proposed is based upon precipitation in hydrochloric acid solution by means of caustic soda or ammonia, adding an excess of sodium or ammonium sulphid, acidifying strongly with acetic acid, and stirring and collecting the precipitate of iron and zinc, if the latter is present, on the filter. The iron may be separated from the zinc by dissolving in hydrochloric acid and precipitating with ammonia.

On plastein, D. D. Van Slyke and P. A. Levene (*Proc. Soc. Expt. Biol. and Med., 6 (1908), No. 1, pp. 11–13*).—Studies are reported of the cleavage products of plastein, the "protein-like substance or substances precipitated from concentrated albumose solutions by the action of enzyms. . . .

"Of the 13 amino-acids tested for in plastein the presence was proved of all except alanin, which was not isolated in pure condition. The proportions otherwise were not greatly different from those found in fibrin. It is evident that the plastein ranks with either the complex native proteins or their higher decomposition products.

"In order to obtain evidence indicating with which of the above classes the plastein is to be ranked, viscosity measurements were employed. . . .

"These results indicate that the plastein is related to the higher albumoses, and apparently, from its resistance to alkali, to the anti-albumoses rather than to the native proteins."

Investigations with carbohydrates and ferments, E. Fischer (*Untersuchungen über Kohlenhydrate und Fermente. Berlin, 1909, pp. VIII+912*).—In this volume the author has collected the papers which he and his students published from 1884–1908 on carbohydrates. As arranged the papers cover general summaries, nitrogen derivatives of sugar, synthesis and configuration of monosaccharids, disaccharids, glucosids, ferments, and supplementary papers. The volume is supplied with a full index.

Practical treatise on food analysis, E. Gérard and A. Bonn (*Traité Pratique d'Analyse des Denrées Alimentaires. Paris, 1908, pp. VI+598, figs. 42*).—A handbook on food analysis. The different chapters include fermented beverages, fats, starches, tea, coffee, coco, and chocolate, sugar and similar goods, condiments, meat goods, waters, crockery and other utensils, and preservatives.

An apparatus for extracting with hot ether, W. Kolka (*Biochem. Ztschr., 13 (1908), No. 1–2, pp. 134–137, fig. 1*).—A modified form of the Soxhlet apparatus for the extraction of fat is described.

The use of carbon tetrachlorid in the determination of fat, O. Rammstedt (*Chem. Ztg., 33 (1909), No. 11, pp. 93, 94*).—With carbon tetrachlorid higher values were obtained when oils were extracted from linseed and several species of Brassica than with ether. Hence, this method can not be recommended.

The precipitin reaction, D. Franceschelli (*Arch. Hyg., 69 (1909), No. 3, pp. 207–222*).—Experimental studies of the precipitin reaction are reported and discussed.

Rapid determination of starch in sausage and other meat products, F. Telle (*Rev. Internat. Falsif., 21 (1908), No. 2, pp. 40, 41*).—A modification of the Baudry polarimetric method for the determination of starch is reported.

Estimating phosphorus compounds in cereals, P. Carles (*Ann. Chim. Analyt., 14 (1909), No. 2, pp. 57, 58*).—Instead of incineration in the usual way the author states that greater accuracy may be obtained by incinerating the material after mixture with niter and bicarbonate of soda.

Detection of bleached flours, L. Weil (*Chem. Ztg., 33 (1909), No. 4, p. 29; abs. in Analyst, 34 (1909), No. 396, p. 102*).—As the author points out, flours bleached by ozonized air may readily pass for higher grade than that to which they belong. The detection of bleaching by means of the color reaction for nitrous acid he considers satisfactory only as a preliminary test and believes that as a final test the sample should be so treated that the original color is restored. Bleached flours revert in color during storage far more rapidly than normal flours. This reversion may be so accelerated as to form the basis of a test by aspirating a current of dry sulphuretted hydrogen through the sample in a closed vessel for 1 hour. In the case of bleached flours the difference in color as compared with the original is very marked, whereas unbleached flours suffer no change when treated with sulphuretted hydrogen.

Sumac leaves as an adulterant of pepper, F. Netolitzky (*Arch. Chem. Micros., 1 (1908), p. 239; abs. in Pharm. Zentralhalle, 49 (1908), No. 44, pp. 902, 903*).—The author identified *Cotinus coggygria* and *Rhus coriaria* leaves as adulterants of pepper.

Adulteration of ground red pepper, P. Grandmont (*Jour. Pharm. et Chim., 6, ser., 27 (1908), No. 11, pp. 522–526, figs. 4*).—The detection of the adulteration of red pepper by organoleptic and miscroscopical means is considered.

A new method of examining impure sugar sirups with the refractometer, J. Tischtschenko (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 637, II, pp. 103–108*).—A modified method is proposed.

The identification of pure olive oil which gives the Baudouin reaction, A. ZEGA and K. N. TODOROVIC (*Chem. Ztg., 33 (1909), No. 12, p. 103*).—According to the authors' observations the red color obtainable with hydrochloric acid extract of some olive oils is considerably more fugitive than when even a small quantity of sesame oil is present.

Simultaneous determination of sulphates, total acidity, and tannin bodies in wine, P. DUTOIT and M. DUBOUX (*Schweiz. Wchnschr. Chem. u. Pharm., 46 (1908), No. 43, pp. 690–694, dgms. 4*).—A contribution to the subject of wine analysis.

Analytical study of the acidity of wine, P. DUTOIT and M. DUBOUX (*Schweiz. Wchnschr. Chem. u. Pharm., 46 (1908), No. 42, pp. 672–678, dgms. 5*).—A progress report of the determination of acids of wine.

Estimating total sulphurous acid in wine, C. BLAREZ and L. CHELLE (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 8, pp. 690–693*).—A study of methods.

Cryoscopic examination of wine, W. MESTREZET (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 5, pp. 250–254*).—The experimental data reported have to do with the relation of alcohol content to the lowering of the freezing point.

Fluorin in wine, C. MENSIO (*Staz. Sper. Agr. Ital., 41 (1908), No. 12, pp. 819–835*).—A contribution to the subject of the identification and estimation of fluorin in wine.

Beer analysis, J. RACE (*Jour. Soc. Chem. Indus., 27 (1908), No. 11, pp. 544–548*).—The author presents the results of a study of the principal processes used in the analysis of beer, paying special attention to the estimation of alcohol and extract (total solids) with the refractometer, and to the determination of sulphates and chlorids. The paper is followed by a discussion.

Determination of sulphurous acid in food materials, especially gelatin, L. PADÉ (*Rev. Soc. Sci. Hyg. Aliment., 4 (1907), No. 3, pp. 65, 66*).—In the method described sulphurous acid is liberated by treating the sample with phosphoric acid and collected in a solution of iodin and potassium iodid.

The detection of hydrogen peroxid, formaldehyde, and persulphates, S. ROTHENFUSSER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 16 (1908), No. 10, pp. 589–591*).—Hydrogen peroxid and persulphates may be detected by an alcoholic solution of benzidin, thus reversing the action used by Wilkinson and Peters (E. S. R., 20, p. 1108) as a test for heated milk. Several methods for detecting formaldehyde are proposed.

Calcium sulphate and lead in commercial tartaric acid, R. L. GOMEZ (*Rev. R. Acad. Cien. Madrid, 6 (1908), No. 11, pp. 853–859*).—From the analyses reported the author concludes that the lead sulphate content may be ascertained by multiplying the weight of calcium sulphate by 2.22.

Second report of the conference for feeding stuff inspection, G. H. VAN DER WAL and J. J. A. WIJS (*Pharm. Weekbl., 45 (1908), No. 23, pp. 661–688*).—At the meeting at Zaandam, July, 1908, the question of the extraction of fat was considered and results obtained with bread and concentrated feeding stuffs by different methods were compared.

The detection of watered milk by the aid of the refractometer, E. ACKERMANN (*Ann. Chim. Analyt., 13 (1908), No. 12, pp. 469–471, fig. 1*).—The author reports further use of the Zeiss immersion refractometer (E. S. R., 18, p. 811).

On the detection of watered milk with the refractometer, E. ACKERMANN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 16 (1908), No. 10, pp. 586–589; abs. in Chem. Zentbl., 1909, I, No. 3, p. 220*).—Further notes on the method noted above, which is compared with that of Baier and Neumann (E. S. R., 18, p. 1019).

On the methods of estimating fat in milk, M. BEAU (*Ann. Sci. Agron., 3. ser., 1 (1906), II, No. 3, pp. 465–474*).—The Gerber, Adams, and other methods of estimating fat are reviewed in detail and criticised. The author finds that the Röse-Gottlieb method alone fulfills all requirements and thinks it should be universally adopted.

Mitchell-Walker test bottle, J. W. MITCHELL and W. O. WALKER (*Ontario Dept. Agr. Bul. 170, pp. 6, figs. 5*).—This bulletin illustrates and describes a new form of the Babcock test bottle and a centrifuge by which water can be readily added to the bottle while the machine is in motion, thus saving much time. The centrifuge, which can be placed on the ordinary machine, consists of a hollow cylinder with perforated walls and wire gauze bottom.

"The bowl and graduated neck of the bottle are similar to those of the ordinary test bottle. In addition our bottle possesses a second neck of a funnel or inverted cone shape for receiving the water from the water centrifuge on the spindle. The upper end of this neck is beveled for the twofold purpose of catching the water from the centrifuge and preventing the fat in the graduated neck from overflowing. The lower end of the neck is reduced in size and prolonged into a curved tube for the purpose of preventing any fat from rising into it during the test. Furthermore, the direction in which it curves, namely, toward the outer wall of the bottle, causes the acid to flow down the side of the bottle to the bottom, thus avoiding its mixing with and charring the sample. . . . As the machine revolves, the water in the centrifuge is forced by the centrifugal action outward in the form of a spray and is caught by the cone-shaped necks of the bottles circularly arranged."

On the examination of milk that has been treated with lime-sugar solution, E. BAIER and P. NEUMANN (*Ztschr. Untersuch. Nahr. u. Genussmtl., 16 (1908), No. 1–2, pp. 51–63; abs. in Analyst, 33 (1908), No. 391, p. 401; Milchw. Zentbl., 5 (1909), No. 3, pp. 133, 134*).—This article is a report of the results of chemical analyses of lime-sugar solution (which is similar to what is known as viscogen in this country) and the milk to which it has been added. The results are compared with those of Reuss and with those of Lührig (E. S. R., 17, p. 397).

To detect the presence of sucrose the milk is treated with uranium acetate. An acid solution of ammonium molybdate solution is added to the filtrate and the mixture heated for 5 minutes in a water bath. If sucrose is present a blue color appears, but with pure milk the color is apple-green. The lime is determined in the usual way from the filtrate after coagulating with hydrochloric acid. The addition of lime-sugar solution to milk does not appreciably raise its specific gravity, although the addition of 1.1 cc. to 100 cc. of milk may obscure an addition of 10 per cent of water.

On the value of tests for lime-sugar solution in milk and milk products, H. LÜHRIG (*Molk. Ztg. [Hildesheim], 23 (1909), No. 9, pp. 225, 226*).—The author tested 45 samples of milk and found the amount of lime remaining in the filtrate by the use of the above method without heating to vary from 10.2 to 20.8 per cent. In 7 samples allowed to coagulate naturally the amount of lime recovered ranged from 7.2 to 17.1 per cent.

The detection of "sugar-lime" in milk and cream, K. FRERICHS (*Ztschr. Untersuch. Nahr. u. Genussmtl., 16 (1908), No. 11, pp. 682, 683; abs. in Analyst, 34 (1909), No. 395, p. 54*).—A note on the above methods.

A means of distinguishing goat's milk from cow's milk, W. H. HORROCKS (*Vet. Jour., 65 (1909), No. 404, pp. 89–94*).—In Gibraltar there is a tendency to adulterate cow's milk with goat's milk, as the latter is cheaper. The author describes experiments in which he used the methods of Wassermann and

Schütze to determine the specific reaction and specificity of lacto-sera of goat's milk, and draws the following conclusions: "It would appear that if goat's milk is injected into a rabbit in considerable quantities and at frequent intervals the lacto-serum obtained will precipitate the casein of cow's milk as well as that of goat's milk. Under these conditions it is necessary to dilute the lacto-serum 1 in 10, in order to demonstrate the specific reaction. As a rule, when quantities not exceeding 10 cc. are injected either intra-peritoneally or subcutaneously at intervals of about 7 days, the lacto-sera obtained are specific."

One part of goat's milk when added to three parts of cow's milk can be detected in 2 hours with an active goat's lacto-serum. The effect of heat upon the lacto-serum was also investigated, with the following results: "Boiling goat's milk for 1 hour does not interfere either with the production of a lacto-serum or with the formation of a precipitate by the specific serum. Heating the lacto-serum at 60° C. for 2 hours or at 65° for half an hour destroys its specific properties."

The value of the Polenske test in the analysis of oils and fats, R. R. Tatlock and R. T. Thomson (*Jour. Soc. Chem. Indus., 28 (1909), No. 2, pp. 69–72*).—The authors describe in detail their experiments with the Polenske method. "It is apparent from these results that the possibility of the detection of even 10 per cent of coconut oil in a butter by the Polenske method is very doubtful. . . . We may add that, so far as our trials have gone, we can not place any reliance on the methods of detecting coconut oil which are dependent upon silver, copper, or baryta values.

"As regards the detection and estimation of coconut oil in margarin, the Polenske number appears to be quite reliable within limits of, say, 5 per cent."

Iodin value of oils, L. E. Levi and E. V. Manuel (*Jour. Amer. Leather Chem. Assoc., 3 (1908), pp. 386, 387; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 2, p. 98*).—"Experiments with cod, olive, sperm, neat's-foot, and 'tan' oils showed that carbon tetrachlorid or pentachlorethan may be substituted for chloroform in the determination of the iodin value of oils by the Hanus method."

Denaturing of cotton-seed oil, G. Winterfeld (*Chem. Ztg., 33 (1909), No. 5, pp. 37, 38; Mitt. K. Materialprüfungsamt Gröss-Lichterfelde West, 27 (1909), No. 1, pp. 28–31; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 3, p. 150*).—The author has made experiments to determine to what extent alkali solutions are effective in denaturing cotton-seed oil. He finds that "in the case of cotton-seed oil containing 10 to 15 per cent of potassium hydroxid solution of specific gravity 1.32 or of sodium hydroxid solution of specific gravity 1.34, it is possible to recover from 60 to 80 per cent of the oil, which, though of inferior quality, might still be used for food purposes, but that it is questionable whether the treatment would be profitable."

Salvadora oleoides fat, D. Hooper (*Agr. Ledger, 1908, No. 1 (Veg. Prod. Ser., No. 106), pp. 1–5; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 2, pp. 97, 98*).—The fat obtained from the seeds of *S. oleoides* used as a "resist in dyeing" is solid at ordinary India temperatures and can be distinguished from other Indian fats by its low iodin value and high saponification value. It is thought that it should be useful for candy making, hard soap, and pharmaceutical products.

Some oils of Japanese plants, M. Tsujimoto (*Chem. Rev. Fett u. Harz Indus., 15 (1908), Nos. 6, pp. 140–143; 7, pp. 167–170; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 3, pp. 142–144*).—Physical and chemical properties are reported on oils derived from the seeds of *Thea japonica*, *T.*

sasanqua, *Torreya nucifera*, and *Cephalotaxus drupacea*, and from the fruit of *Cinnamomum camphora* and *Machilus thunbergii*.

The analysis of chestnut wood, W. K. ALSOP (*Jour. Amer. Leather Chem. Assoc., 4 (1909), No. 4, pp. 95–99*).—Extractions of leached wood were made by different methods.

"It is apparent that the amount of extractive matter obtained from chestnut wood depends upon the time of extraction and the rate of boiling, or amount of water passing on the wood. Some substances soluble in the water are yielded up almost indefinitely." The author thinks it will be difficult to devise a general method of analysis of new and spent wood, because it is practically impossible to duplicate in the laboratory the conditions that prevail at the factory. "The discrepancies between the amount of extractive matters, of total solids, found in the factory and at the laboratory, are probably much greater than is the case with the tanning content."

Destructive distillation of pine, fir, birch, and beech woods, P. KLASON, G. VON HEIDENSTAM, and E. NORLIN (*Ark. Kemi, Min. och Geol., 3 (1908), No. 2, Arb. 10, pp. 17, pls. 8; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 3, p. 132*).—The charcoals from these four woods have about the same chemical composition and yield about the same quantity of acetone. The pine and fir yield about one-half as much acetic acid and methyl alcohol as the birch and beech.

"Taking 275° C. as the reaction temperature, the thermal effect of the carbonization was calculated from the heat of combustion of the wood and of the distillation products (both at 20°), and the specific heats and heats of evaporation of the constituents. The following were the results: Cotton, 152 calories; fir wood, 317; pine, 223; birch, 289; and beech wood, 316 calories. In the case of the four woods the thermal effect amounted to about 6 per cent of the heat of combustion of the wood."

Production of alcohol from cellulose, T. KOERNER (*Ztschr. Angew. Chem., 21 (1908), No. 46, pp. 2353–2359; Sci. Amer. Sup., 67 (1909), No. 1736, pp. 238, 239*).—This article describes a method of obtaining alcohol from wood and wood products. The yield of sugar and alcohol obtained from sawdust by different investigators differs greatly. The author obtained a yield of absolute alcohol equal to 6 per cent of the weight of dry wood. Sulphite cellulose yielded twice as much alcohol as wood. The yield of alcohol was increased by hydrogen dioxid but diminished by stronger oxidizing agents. The sugar which was converted into alcohol was derived from cellulose and not at all from lignin.

Report of the Hildesheim Agricultural Experiment Station, AUMANN (*Ber. Landw. Vers. Stat. Hildesheim, 1908, pp. 14*).—This is the annual report of the director of the station, and consists chiefly of analytical data on fertilizers and feeding stuffs.

METEOROLOGY—WATER.

The Mt. Rose Weather Observatory, 1906–1908, J. E. CHURCH, Jr. (*Nevada Sta. Bul. 67, pp. 7–36, pls. 28, map 1*).—This report gives an account of the origin, construction and equipment, observations, and plans of work of this observatory. In the establishment of the observatory the University of Nevada, the experiment station, the Weather Bureau of this Department, and various individuals cooperated. Its equipment consists of a small observatory house, rain gage, evaporimeter, anemometer, shelter with meteorograph of 40 days range, and a barograph of 35 days range at the summit of Mt. Rose (10,800 ft. above sea level), and a refuge camp part way up the mountain.

Observations recorded deal with the climatology of Mt. Rose, plant environment, the relation of timber to the conservation of snow, frost forecasting from Mt. Rose, storms, and clouds. Partial reports of these observations have already been noted (E. S. R., 18, p. 529; 19, p. 413).

The observations indicate that weather changes are distinctly indicated at the summit of Mt. Rose some time in advance of such changes in the valleys below, i. e., that the weather changes advance from west to east more rapidly in the upper air of the mountain top than in the lower air, but they also indicate "that the descent of storms from high altitudes is a greater factor in the understanding of weather conditions than the progress of storm areas from west to east." The cloud movements on the mountain top give visible evidence of these descending storms.

Extension of equipment and observations, with a view especially to the development of the study of plant environment, frost forecasting, and snowfall and the relation of mountain timber to conservation of snow, is planned.

"As soon as the instruments can be made, meteorographs will be installed under competent care at Truckee, Cal. (5,819 ft.), and at Fallon, Nev. (3,965 ft.), in order to obtain data for a careful comparison of the changes of the weather as it passes from west to east and from high to low altitudes."

One of these places is at the west end of the upper Truckee Basin and the other in Carson Sink. Both regions can be seen from Mt. Rose. "One represents the semimountain belt of eastern California, the other the fertile agricultural district of western Nevada."

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 2 (1909), pt. 1, pp. 54, figs. 4, charts 6*).—This number contains the following articles: Vertical Temperature Gradients of the Atmosphere, Especially in the Region of the Upper Inversion (illus.), by W. J. Humphreys; Auroral Displays and Magnetic Disturbances at Mount Weather During September, 1908, by W. R. Gregg; and Upper Air Temperatures for July, August, and September (illus.), by W. R. Blair.

The present status of meteorology, E. Esclangon (*Mém. Soc. Sci. Phys. et Nat. Bordeaux, 6. ser., 4 (1908), No. 1, pp. 49–66, figs. 7*).—This is a brief discussion dealing more particularly with the question of weather forecasting and its scientific and practical status.

Warm months in relation to sun-spot numbers, A. B. McDowall (*Nature [London], 79 (1909), No. 2048, pp. 367, 368, fig. 1*).—A method of comparison is described which gave results indicating a direct relation between sun-spots and warmth.

The weather for 1908, W. O. Hayes (*Arizona Sta. Rpt. 1908, pp. 376–382*).—The temperature and rainfall of each month at Tucson, Phoenix, Yuma, and four other places in the Territory during each month of the year are reported. Diagrams are given illustrating the sharp fluctuations in temperature which frequently occur, due mainly to the dryness of the air. The precipitation for the year was slightly above the normal for the Territory and at Tucson it was about 3 in. higher than the average for the preceding 27 years.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. Ostrander and R. C. Lindblad (*Massachusetts Sta. Met. Buls. 243, 244, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during March and April, 1909. The data are briefly discussed in general notes on the weather of each month.

Meteorological summary for the year 1907, F. A. Smith (*Wyoming Sta. Rpt. 1908, pp. 87–94*).—Summaries are given of observations at Laramie, Wyo., on pressure, temperature, precipitation, humidity, sunshine and cloudiness, and

wind movement during 1907. The mean annual temperature was 42° F., and the total precipitation 9.46 in.

Meteorological observations in Brunswick, 1906–7, Dörr (*Beitr. Statis. Braunschweig, 1908, No. 23, pp. 3–20*).—This report includes detailed summaries of observations at 82 stations on precipitation (including snowfall), cloudiness, temperature, frosts, and hail during 1906 and 1907. A summary of precipitation at 10 stations during 25 years, 1882–1906, is also given.

Weather and crop conditions in Bohemia during 1906–7, J. Bělohav (*Mitt. Statis. Landesamt. Böhmen, 11 (1906 7), No. 1, pt. 1, pp. I–XXXVII, figs. 6*).—This article discusses briefly the meteorological conditions controlling the weather and the relation of climate to crops, and traces the influence of weather conditions on crop growth in Bohemia during the period named.

Climate [of Cuba], V. H. Olmsted and H. Gannett (*Cuba: Population, History and Resources 1907. Washington, D. C.: U. S. Bur. of the Census, 1909, pp. 45–54*).—This is a general account of the climate of Cuba based upon observations made at 31 stations in different parts of the island during 1900 to 1907.

It is pointed out that the climate of Cuba is tropical and insular with no extremes of temperature. The yearly average is about 77° F. The warmest month, July, has an average temperature of 82°, the coldest, January, 71°. The extreme maximum was 113° in 1907, the extreme minimum was freezing point in 1906. The rainfall is more variable, the lowest recorded during the period named being 32.5 in. at Batabanó, the greatest, 69.8 in., at Cayamas. The average annual rainfall at Havana was 40.6 in. The least rainfall occurs as a rule on the coast, the greatest in the interior. There are distinct wet and dry seasons, 72 per cent of the annual rainfall occurring from May to October. The number of clear days varied from 68 in Guayabal to 274 at Cifuentes.

Atmospheric humidity and the flow of springs, Haedicke (*Gesundhts. Ingen., 32 (1909), No. 11, pp. 173–175, figs. 2*).—The results of a series of observations as here reported and platted in a diagram show that in the case observed the flow of the springs was appreciably affected only after long periods of drought or following very heavy rainfall.

The rainfall and the springs of Limousin, P. Garrigou-Lagrange (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 1, pp. 60–62; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 3, p. 91; Sci. Abs., Sect. A—Phys., 12 (1909), No. 134, pp. 72, 73*).—Continuing previous studies, the author reports a deficit of water in the river Vienne at Limoges in 1908 following a deficiency of rainfall in the drainage area of the river in 1906, 1907, and 1908. He discusses the injury such deficits may do to agricultural and industrial interests.

Underground waters of southern Maine, with records of deep wells, F. G. Clapp and W. S. Bayley (*U. S. Geol. Survey, Water-Supply Paper No. 233, pp. 268, pls. 2, figs. 4*).—"The area covered by this report is roughly triangular and includes all of southern Maine, from the coast northward beyond Calais, Oldtown, Skowhegan, and Rangeley. Its northern boundary may be said to follow very nearly the line of the forty-fifth parallel, but a few towns situated a short distance north of the line have, for special reasons, been included in the discussion. . . . In order to meet the needs of all classes of readers the report is so subdivided as first to describe the general water resources of the region, the dependence of quality and quantity on character of rocks, the location and type of wells, etc., and then to discuss in detail the conditions in the various counties, for the benefit of persons needing local information. The table of deep wells . . . is appended for the benefit of persons desiring to drill wells."

Ground waters of the Indio region, California, with a sketch of the Colorado Desert, W. C. Mendenhall (*U. S. Geol. Survey, Water-Supply Paper No.*

225, pp. 56, pls. 12, figs. 5).—This report deals with geography, geology, and water resources of this region, with some account of the exploration and development of the Colorado Desert, particularly of the Indio region, cost of reclamation and development, and soils and crops.

It is estimated that in this region there is a storage area of 400 square miles containing saturated sand to an average depth of 1,000 ft. The amount of underground water utilized in the year 1905 is estimated to have been 100 second-feet for the irrigating season, equivalent to 20 to 25 second-feet for the year. The level of the ground water had been materially lowered before 1905, but was restored by the exceptional rainfall of 1904–5, amounting to 8.58 in. as compared with an average of 2.65 in. It is shown that there is a gradual drift of the ground water toward the Salton Sink, and it is believed that the partial filling of this sink has had a tendency to conserve the water by retarding this flow and lessening evaporation.

The first successful hydraulic well was put down at Indio in April, 1900. Since that date development has been continuous and there are now from 350 to 400 deep wells scattered over the Indio region. Of this number, 250 to 300 are artesian. About 90 pumping plants have been installed. It is estimated that more than $100,000 is invested in artesian wells in the valley and that pumping plants to an additional value of $75,000 have been installed. This, with cost of reservoirs, pipe lines, etc., brings the total investment in works for development and distribution of water up to $200,000. With the water so obtained between 4,000 and 5,000 acres have been reclaimed and are successfully irrigated. The most important crops grown in the region are melons, barley, and alfalfa. A number of other crops are also grown in small areas.

Underground water resources in southern California, W. C. Mendenhall (*Rpt. State Engin. Cal., 1907–8, pp. 142–146*).—This article contains a brief summary of a previous report of the U. S. Geological Survey on this subject (E. S. R., 20, p. 813), and also a short progress report by the geologist in charge of underground water investigations in this region setting forth the character of the investigations which are now being carried on.

Analyses of Salton Sea water, A. E. Vinson and W. H. Ross (*Arizona Sta. Rpt. 1908, pp. 363–365*).—Analyses made at different times during the formation of this sea are reported. The results indicate that since the Colorado River was turned into its proper channel the composition of the water has remained practically unchanged.

The mineral constituents of the Ottawa River water, 1907, F. T. Shutt and A. G. Spencer (*Proc. and Trans. Roy. Soc. Canada, 3. ser., 2 (1908–9), Sect. III, pp. 175–180*).—Analyses of samples taken at extreme low water and at flood show "that the mineral matter of this water is composed mainly of the carbonates of the alkaline earths with some silica and small quantities of the alkalis, iron, alumina, and manganese."

Amount and composition of drainage waters collected during the year 1907–8, B. C. Burt (*Rpt. Cawnpore [India] Agr. Sta., 1908, pp. 18–21; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 557, II, p. 261*).—This is a brief statement of the results of a continuation of observations with 3 and 6-ft. drain gages previously referred to (E. S. R., 20, p. 711). With bare soils and an annual rainfall of 17.15 in. the percolation in the two 3-ft. gages was 5.92 and 6.76 in., respectively, and with the 6-ft. gages 3.64 and 4.84 in., respectively. The drainage water contained nitrates corresponding to 32.49 and 37.15 lbs. per acre, respectively, in case of the 3-ft. gages and 9.65 and 13.83 lbs. per acre, respectively, in case of the 6-ft. gages.

SOILS—FERTILIZERS.

Forest soils, E. HENRY (*Les Sols Forestiers. Paris and Nancy, 1908, pp. 492, pls. 5, dgms. 3, maps 2; Ann. Sci. Agron., 3. ser., 2 (1907), I, pp. 251–418; II, pp. 1–322, pls. 5, dgms. 3, maps 2; rec. in Bul. Soc. Nat. Agr. France, 68 (1908), No. 9, pp. 732–734*).—This, the first exhaustive treatise on this subject, is based largely upon the special researches of the author, particularly in the parts dealing with the formation and character of the dead and living forest cover and their influence upon the moisture of the soil.

After a general introductory chapter defining and describing the properties of forest soils as distinguished from ordinary cultivated soils, the book takes up in order chapters dealing with the following subjects: Dead forest cover, chemical rôle of the cover, physical rôle of the dead cover, deterioration of soil due to removal of dead cover, living cover, decomposition of dead cover and formation of neutral humus by eremacausis, mixture of humus and mineral soil constituents, crude or partially formed humus, peaty humus and peat beds in forests, chemical properties of forest soils, exhaustion of soils by forest growth, physical properties of forest soils, soil moisture and the forest, the forest and underground water, the distribution of forests in relation to the geological areas of France, types of forest soils, and improvement of forest soils.

Tables are added at the end which give analyses of a large number of soils of typical forest areas in France.

Soil analysis, R. F. HARE (*New Mexico Sta. Rpt. 1908, pp. 32–35, 36–38*).—Chemical examinations of mesa land used for experimental purposes at the station are reported, showing a marked deficiency of nitrogen and humus in these soils.

Soils, B. C. ASTON (*New Zeal. Dept. Agr. Ann. Rpt., 16 (1908), pp. 290–312*).—Chemical analyses of a large number of soils from different parts of New Zealand made in pursuance of a proposed complete soil survey of the country are reported, with brief discussion of certain peculiar types of soils which were encountered in the examination.

Netherlands soils and Rhine and Maas deposits of the more recent tertiary and the older diluvial periods, P. TESCH (*Der Niederländische Boden und die Ablagerungen des Rheines und der Maas aus der jüngeren Tertiär- und der älteren Diluvialzeit. Proefschr. Tech. Hoogeschool Delft, 1908, pp. 74, pl. 1*).—The results of examinations of samples obtained from borings in different parts of north Limburg are reported and discussed with relation to previous geological investigations of a similar character.

Soil of acid reaction, Y. KOZAI (*Chem. Ztg., 32 (1908), No. 98, p. 1187; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 555, II, p. 87; Chem. Zentbl., 1909, I, No. 3, p. 209; Chem. Abs., 3 (1909), No. 9, p. 1052*).—Attention is called to a peculiar soil of acid reaction found near Tokyo. It contained hydrated silicates, particularly clays, and when a sample free from humus was washed with water the acidity remained unchanged, but when a soluble neutral salt such as potassium chlorid or ammonium sulphate was added, a soluble acid was detected at once. Apparently the potassium or ammonium was absorbed by the clay with the liberation of hydrochloric or sulphuric acid. As a result the productiveness of the soil was decreased by applications of such potash or ammonium salts.

The erosion of the veld, A. C. A. VAN ROOY (*Agr. Jour. Cape Good Hope, 34 (1909), No. 2, pp. 158–165*).—This is a discussion of the serious loss of soil and water which is occurring in the cattle-raising regions of South Africa.

Soil resources and their utilization, M. E. CARR (*Penn. Dept. Agr. Bul. 169, pp. 57–67*).—This article points out that our agricultural production has here-

tofore been largely maintained by extension of the cultivated area, but emphasizes the fact that a period has now been reached when more attention must be given to improvements of methods and better utilization of soil resources.

A possible method of reclamation for the arid West, W. O. Meir (*Westminster, Colo., 1909, pp. 21*).—In this pamphlet it is argued that the formation of a series of lakes in Salton Basin, Death Valley, and Carson Sink would greatly increase the humidity of this now arid region. "The first improvement that should be undertaken in this plan of reclamation is the filling of Salton Sea Basin."

Contribution to the study of the absorbent power and of the solutions of soils, E. Rousseaux and C. Brioux (*Ann. Sci. Agron., 3. ser., 3 (1908), II, No. 3, pp. 370–396; Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 1, pp. 9–26; abs. in. Chem. Abs., 3 (1909), No. 9, p. 1052*).—The investigations reported were made with a sandy soil, the basis of which is green sand, and with a clay soil or galt. Chemical and physical examinations of these soils, as well as determinations of the constituents removed by extraction with water, are reported. The distribution of the phosphoric acid in soil particles of different grades and in the soil humus was also studied.

The results of these experiments agree with those reported by other investigators in showing that certain fertilizing constituents, such as nitrates, sulphates, chlorids, and lime, are freely removed in the drainage water, and that potash is more strongly held. The amount of the latter constituent which passes into solution in the soil depends upon the original fertility of the soil and the amount of potash fertilizer added. All of the evidence obtained goes to show that the water which surrounds the soil particles contains much more nitrate and lime in a soil liberally manured than in a poor or exhausted soil.

Phosphoric acid is much less soluble than the other constituents mentioned and the amount of this constituent in soil solutions is generally very small. Nevertheless, it varies widely in different soils, ranging in the experiments reported from 0.5 to 18 mg. per liter. The amount yielded to solution, however, is constant for a given soil and furnishes a fixed characteristic of the soil. In a soil poor in lime and containing little clay, with a moderate amount of phosphoric acid, this constituent was found to be in large part in combination with the humus of the soil. A deficiency of lime is accompanied by low solubility of humates and a consequent reduction of the solubility of the phosphoric acid. It was found that application of free lime either in the form of slag or of burnt lime reduced the solubility of humus and phosphoric acid without decreasing the percentage of phosphoric acid indicated as assimilable by Dyer's method. The application of chemical fertilizers resulted in the solution of a considerable quantity of silica, this effect being most marked in siliceous and ferruginous soils.

In later experiments on the absorption of phosphoric acid and potash by soils of different kinds, the authors observed that potash was as a rule much more rapidly absorbed but was ultimately less firmly fixed than phosphoric acid. Soluble phosphoric acid applied in the form of superphosphate must be thoroughly diffused in the soil before it is completely fixed. The acidity due to the superphosphate persists for a long time in soils deficient in lime, undergoing an intermediate fixation with iron oxid, alumina, and humus. Care must therefore be exercised not to use superphosphates on soils which are naturally of acid reaction.

On the suspension of solids in fluids and the nature of colloids and solutions, F. H. King (*Separate from Trans. Wis. Acad. Sci., Arts, and Letters 16 [1908], pt. 1, pp. 275–288*).—This paper develops the theory, based upon "studies of soil solutions and of the influence of soils and sands upon solutions

of extremely soluble salts . . . that solids immersed in a fluid may retain about or upon their surfaces a layer of the fluid which is restrained by them from moving, or is compelled to move with them, in such a manner as to become an integral part of a compound system of solid and fluid." The bearing of this theory on the suspension of solids such as fine soil particles in liquids or dust particles in air, on the retention by filters of the soluble substances in solutions, and on the flocculation of suspended particles as in case of silt and sea water, is explained. It is shown that the adherent film of water greatly increases the effective cross-section of a particle of silt, for example, and correspondingly reduces the force required to maintain it in suspension. "When the turbid water of a stream commingles with the salt water of the sea there begins at once a reduction of the thickness of water films about the suspended sediment, which increases their effective specific gravity and at the same time increases the surface tension, causing flocculation, which carries to the bottom both the silt and a portion of the salts which initiated flocculation and final precipitation."

Some phases of soil investigation. T. F. Hunt (*Penn. Dept. Agr. Bul. 169, pp. 45–52*).—This article points out the importance of (1) a soil survey, (2) cooperative plat tests of fertilizers and cultural methods on different types of soil, and (3) a study of factors affecting plant growth on different soil types.

Rôles of the soil in limiting plant activities. B. E. Livingston (*Plant World, 12 (1909), No. 3, pp. 49–53*).—The dependence of plant activities upon the physical properties of the soil, especially those properties controlling or modifying the movement and supply of soil water with its dissolved substances, is discussed.

Observations and researches on soil temperature. II. S. de Grazia (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 333–347, pls. 2; Staz. Sper. Agr. Ital., 41 (1908), No. 9–11, pp. 689–703, pls. 2; abs. in Chem. Zentbl., 1909, I, No. 6, p. 459*).—This is a continuation of work previously reported (E. S. R., 20, p. 620), but dealing with the influence of soil temperature on the growth of certain plants during the early stages of their growth.

The observations were made 10, 17, 24, and 31 days after sowing. In normal conditions of soil, humidity, temperature of the surrounding air, and for soil temperature between 10 and 15° C. the observations show that potatoes, corn, wheat, and hemp during the first stages of growth are responsive to small increases of soil temperature, even as small as 0.5°. The various species are differently influenced; corn and potatoes in comparison with hemp and wheat show the effects for a longer time, beginning with germination. The beneficial effect of such increases of temperature is shown in a notably more rapid development of both stems and roots, especially the latter.

Nitrification and denitrification in soils. S. von Rafajewski (*Beiträge zur Kenntnis der Nitrifikation und Denitrifikation im Boden. Inaug. Diss. Gottingen, 1906, pp. 85, pl. 1; rev. in Neues Jahrb. Min., Geol. u. Paläontol., 2 (1908), No. 2, Ref., p. 186; Jour. Soc. Chem. Indus., 28 (1909), No. 2, p. 77; Chem. Zentbl., 1909, I, No. 4, pp. 309, 310*).—The conclusions drawn from the investigations reported in this article are briefly as follows:

Nitrifying bacteria are most abundant in the top soil to a depth of 10 cm., but are rare at a depth of 50 cm. because of the fact that humus and oxygen are necessary to their life and growth. Following the growth of green manuring plants there is an increase of nitrifying organisms in the deeper layers of the soil. The most favorable temperature for nitrification in soils appears to be about 25 to 27° C., that is about 10° lower than in pure cultures in artificial media. The small amount of soluble organic substances in soils does not interfere with nitrification, but perhaps exerts a beneficial influence since an addi-

tion of 1 per cent of dextrose in pure cultures increases the activity of the organisms. Higher percentages of dextrose, however, injuriously affect the organisms.

Denitrifying bacteria are abundant in the upper layers of the soil. They are irregularly distributed in the deeper layers of the soil, but frequently occur abundantly at a depth of 1 meter. The optimum temperature appears to be nearly identical for nitrifying and denitrifying bacteria in mixed cultures.

The occurrence and the formation of nitric acid in humus and moor soils, F. Weis (*Forstl. Forsögsv., 2 (1908), No. 2, pp. 257–296; abs. in Chem. Ztg., 33 (1909), No. 18, Repert., p. 79; Zentbl. Agr. Chem., 38 (1909), No. 3, pp. 145–148*).—It is generally stated that on account of deficient nitrification nitric acid does not occur in forest soils rich in humus, but the author found it regularly in considerable amounts in Danish forest soils of various kinds, as well as in moor soils. The amount was very variable, but it was found that nitrification not only occurred in the warm summer months but also went on actively in October and November, as well as in December.

Nitrification in Transvaal soils, R. D. Watt (*Transvaal Agr. Jour., 7 (1909), No. 26, pp. 202–205*).—Reference is made to experiments which the author thinks show conclusively that not only are nitrifying bacteria present in abundance in Transvaal soils, but that they are in a state of greater activity than in the soils of temperate countries on account of the higher temperature prevailing. Further studies indicated that while the activity of the organism was retarded by the long winter droughts which occur in Transvaal, the organisms were not destroyed but remained in a resting state. The use of manure and of cultivation to produce more favorable conditions for nitrification is discussed and it is shown that in one case a single cultivation of the surface soil resulted in an increase of over 1 per cent in the moisture of the surface layer and in a higher nitrifying power in the cultivated soil.

Nitrogen fixing bacteria, IV, F. Löhnis and T. Westermann (*Centbl. Bakt. [etc.], 2. Abt., 22 (1908), No. 7–10, pp. 234–254, pl. 1; abs. in Chem. Ztg., 33 (1909), No. 37, Repert., p. 173*).—This article reports the results of comparative tests of Azotobacter derived from different sources and isolated in different ways. It also describes a new nitrogen fixing organism, *Bacillus danicus*, which is classed with *B. malabarensis*, isolated from soil from India. See also previous work (E. S. R., 20, p. 621).

On ammoniacal fermentation, J. Effront (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 4, pp. 238–241; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 6, p. 188; Jour. Chem. Soc. [London], 96 (1909), No. 547, II, p. 255*).—The author shows that ammoniacal fermentation may be produced in two different ways, (1) in a strictly anaerobic medium with a pure culture of butyric ferment, and (2) in an aerobic medium with soil. The fermentation produced by inoculation with soil ordinarily gives more rapid and complete results, and is a result of symbiotic action of aerobic ferments and the anaerobic butyric ferment. The butyric ferment was isolated and studied. In distillery refuse it produced ammonia and trimethylamin. Ammoniacal fermentation proceeded at the same rate as the destruction of the dextrose.

The constant occurrence of the butyric ferment in soils and of evidences of its activity indicates that this organism plays an important part in the transformations by which nitrogen derived from the air and that stored in the soil are rendered assimilable for higher plants.

Fixation of atmospheric nitrogen (*Jour. Dept. Agr. West. Aust., 17 (1908), No. 1, pp. 547–550*).—This is a translation of an article by T. Schloesing, Jr., already noted (E. S. R., 19, p. 1023).

Nitragin and its value, A. KÜHN ET AL. (*Mitt. u. Pub. Balt. Samenbau Verbandes, 10 (1908), pp. 37–46*).—Beneficial results from the use of nitragin in a large number of experiments with leguminous plants of different kinds are reported.

Concerning the existence of nonnitrifying soils, F. L. STEVENS and W. A. WITHERS (*Science, n. ser., 29 (1909), No. 743, pp. 506–508*).—Attention is called to the fact that of 62 samples of normal agricultural soils tested at the North Carolina College Station, 44, or 71 per cent, failed to nitrify.

The decomposition of nitrates by bacteria, S. A. SEVERIN (*Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 11–13, pp. 348–370; abs. in Chem. Ztg., 33 (1909), No. 35, Repert., p. 167; Jour. Chem. Soc. [London], 96 (1909), No. 557, II, pp. 255, 256*).—This article reports further studies (E. S. R., 9, p. 1040) of the denitrifying power of *Bacillus pyocyaneus* and *Vibrio denitrificans* isolated by the author from manure. The studies were made with various culture media and with soils of different kinds in presence and absence of oxygen. The denitrifying power of both organisms was greater under anaerobic conditions than in presence of air, the increase being greater in case of *B. pyocyaneus* than in case of the other organism.

The activity of the organisms in general corresponded to the fertility of the soil, but in all cases *B. pyocyaneus* was more energetic than *V. denitrificans*. The latter was less affected by additions of manure and straw than the former. Manure favored denitrification more than straw. The exact rate of denitrification was not determined, because the tests were qualitative in all cases and in few cases was all the nitrate reduced. In no case was the presence of nitrite observed.

Soil fatigue caused by organic compounds, O. SCHREINER and M. X. SULLIVAN (*Jour. Biol. Chem., 6 (1909), No. 1, pp. 39–50, pl. 1*).—Previous investigations bearing on this subject are briefly reviewed, and experiments with wheat and cowpeas grown continuously on the same soil are reported.

It was found that "as the number of recroppings increased the soil came to such a condition that it would no longer give even a fair crop of [cowpeas]." Since wheat and potatoes grew well on this soil after the failure of the cowpeas and the water extract of the soil was found to contain large amounts of plant food, it was concluded that the unproductiveness of the soil was due to the presence of toxic matter. Experiments with water extracts of the soil gave results tending to confirm this conclusion. By distilling the soil with steam, a distillate was obtained which yielded on standing crystals of an organic substance which was found to be toxic to cowpeas. The soil after distillation was found to be more favorable to the growth of cowpeas than before.

Barnyard manure: Its treatment and application to the soil, C. E. THORNE (*Penn. Dept. Agr. Bul. 169, pp. 146–151*).—This is a brief summary of the results obtained in a long series of experiments at the Ohio Sation relating to the losses which occur in manure which is improperly cared for and to the need of reinforcing manure with other fertilizing materials, particularly phosphates. Fine-ground raw phosphate has been found to be a profitable material to use for this purpose.

Bat guano, R. F. HARE (*New Mexico Sta. Rpt. 1908, pp. 35, 39*).—Analyses of a number of samples of bat guanos are reported, and it is pointed out that in view of the fact that these guanos contain nitrogen and phosphorus as well as a certain amount of organic matter, they are an ideal fertilizer for New Mexico soils.

Green manuring, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 33–46*).—This article distinguishes between green manures

plowed under on the field where they grew and those grown in one field and taken to another to be plowed under.

From the results of quite extended experiments the conclusion is drawn that the green manure grown elsewhere is more effective than that grown on the field itself. This greater effectiveness varies with climatic conditions, with the nature of the soil, and the species of plants used, and is due to the fact that the water taken up by the green manure crop is saved for the soil which is manured. This is important in dry regions and in periods of drought.

Experiments with certain fertilizer salts, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 47–49*).—Experiments have been carried on since 1903 to determine the effect of different quantities of the commoner kinds of fertilizer salts (muriate of potash, sulphate of potash, sulphate of ammonia, and nitrate of soda) on the concentration of water solutions in the soil and on the quality of the products obtained. Results for the current year only are given. Large applications of these salts did not cause any great decrease in the product. Muriate of potash did not cause a greater decrease than sulphate of potash. Flax and wheat were almost equally responsive to the kind of salt used.

The diffusion of fertilizer salts in the soil, A. MÜNTZ and H. GAUDECHON (*Ann. Inst. Nat. Agron., 2. ser., 7 (1908), No. 2, pp. 205–238, figs. 30; Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 5, pp. 253–258, figs. 3; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 7, p. 219; Rev. Gén. Sci., 20 (1909), No. 4, pp. 151, 152; Jour. Chem. Soc. [London], 96 (1909), No. 557, II, p. 259; Chem. Zentbl., 1909, I, No. 11, pp. 936, 937; Chem. Abs., 3 (1909), No. 10, p. 1197*).—Observations on the rate of diffusion of soluble salts in different kinds of soils under varying conditions of moisture, etc., are reported, and the conclusion is drawn from the results that the soil may be regarded as a discontinuous medium in which even the most soluble substances diffuse only with extreme slowness and in which there may exist simultaneously and for a long period zones of very different composition unless uniformity is brought about by cultivation or increase of moisture.

The diffusion of fertilizer salts in the soil, P. KRISCHE (*Illus. Landw. Ztg., 29 (1909), No. 27, pp. 277–279, figs. 6*).—A German translation of the above article.

Box experiments with fertilizers, CLAUSEN (*Landw. Wchnbl. Schles. Holst., 59 (1909), No. 9, pp. 138–141*).—Experiments with sulphate of ammonia, 40 per cent potash salt, and superphosphate on oats, clover, wheat, and beets in boxes 1 meter square and sunk in the soil to a depth of 80 cm. are reported. The boxes were surrounded by strips of soil cultivated and planted as in case of the soil in the boxes. The value of this method of experimenting is discussed.

Experiments with commercial fertilizers, especially kainit, on the Peterhof experiment farm, W. VON KNIERIEM (*Balt. Wchnschr. Landw., 46 (1908), No. 12, p. 109; abs. in Zentbl. Agr. Chem., 38 (1909), No. 1, pp. 17–20*).—Experiments with superphosphate, Thomas slag, and potash salts on clover, potatoes, and grain during a number of years are reported.

The potash fertilizer was found to be especially beneficial to potatoes. It was necessary, however, to apply it a sufficient time in advance of planting in order that the injurious effects of the associated salts might be overcome. Thirty per cent potash salt was better suited to potatoes than kainit. Next to potatoes, clover was the crop most benefited by potash fertilizer. The highest yields were obtained with a combination of kainit and Thomas slag.

Denitrification in cultivated soils, G. AMPOLA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 17–19*).—Experiments have been carried on for the past 10 years (E. S. R., 18, p. 1025), and in the present series it was desired to include crops not previously studied, viz, wheat, rye, and flax. The results do not modify in any substantial way the conclusions already drawn. Calcium nitrate was more effective than nitrate of soda and the latter in presence of stable manure was less effective than when used alone. Calcium nitrate usually gave a larger percentage of seed in the total return, and in the case of wheat, a larger absolute amount of seed.

The physiological character of ammonium salts, D. N. PRIANISCHNIKOV (*Ber. Deut. Bot. Gesell., 26a (1908), No. 10, pp. 716–724; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 557, II, pp. 259, 260; Chem. Zentbl., 1909, I, No. 8, p. 682*).—A continuation of previous experiments (E. S. R., 18, p. 539) is reported in this article.

These experiments indicate that the addition of sodium nitrate to ammonium sulphate reduces the physiological acidity of the soil and so influences the assimilation of phosphoric acid from insoluble phosphates. Sodium nitrate is more active in this respect than ammonium nitrate. It was found also that the assimilation of phosphoric acid decreases with the increase of calcium carbonate applied. Without the application of lime, however, the plant becomes overcharged with phosphoric acid, but the yield remains low on account of excessive acidity. This explains the benefit of small applications of lime and phosphorus hunger in case of large applications.

The toxic properties of cyan compounds and their decomposition products used as fertilizers, W. STRITT (*Ztschr. Hyg. u. Infektionskrank., 62 (1909), No. 2, pp. 169–198*).—A study of the toxic properties of pure calcium cyanamid, dicyandiamid, calcium cyanamido carbonate, lime nitrogen, and nitrogen lime, on frogs, rabbits, and dogs, is reported, showing a comparatively small lethal dose of all of these substances for the small animals experimented with.

Tolerance of wheat toward calcium cyanamid, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 51, 301–311; Staz. Sper. Agr. Ital., 41 (1908), No. 9–11, pp. 657–667; abs. in Chem. Zentbl., 1909, I, No. 10, p. 869*).—The conditions under which the experiments were carried on were good as to soil but poor as to moisture. The conclusion is reached that wheat tolerates large applications of calcium cyanamid whether applied some days before sowing or as a top-dressing.

The industrial utilization of atmospheric nitrogen, A. BERNTHSEN (*Österr. Chem. Ztg., 12 (1909), No. 4, pp. 46, 47; abs. in Chem. Zentbl., 1909, I, No. 14, p. 1202*).—This is a brief account of the principal processes which have been proposed for this purpose.

The nitrate industry in Norway, S. EYDE (*Ztschr. Elektrochem., 15 (1909), No. 5, pp. 146, 147; abs. in Chem. Zentbl., 1909, I, No. 13, p. 1120*).—This is a brief account of the present status of the utilization of water power in the production of nitric acid from the nitrogen of the air.

Nitrate and its substitutes, K. W. JURISCH (*Salpeter und sein Ersatz. Leipsic, 1908, pp. VIII+356, pls. 24, figs. 21, dgms. 2*).—This book summarizes information regarding the occurrence, handling, properties, use, and statistics of production and consumption of sodium nitrate, potassium nitrate, ammonium nitrate, lime nitrogen, nitrate prepared from nitrogen of the air by the Birkeland and Eyde process, and ammonia and ammonium compounds. There is also a special chapter devoted to nitrogen fertilizing. At the end of each chapter a full bibliography is given. The literature is not reviewed beyond 1907 and is only partially complete for that year. The statistics do not extend

beyond 1906. The review is, however, the most complete that has recently appeared.

The value of potash silicate, ground phonolith, C. Brömme (*Deut. Landw. Presse, 36 (1909), No. 9, pp. 90, 91*).—It is stated in this article that the availability of potash silicate may be greatly increased by mixing it with manure in the stall, and that its efficiency is greatly increased by letting it lie in the field over winter.

Influence of phosphatic fertilizer on the phosphoric acid and nitrogen of the seed of corn, A. Parrozzani (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 373–382; Staz. Sper. Agr. Ital., 41 (1908), No. 9–11, pp. 729–738*).—The application to corn of increased amounts of mineral superphosphate resulted in a correspondingly increased percentage of total phosphoric acid in the seed. While the phosphoric acid of the lecithin and of the oxymethylphosphoric acid of the seed increased, that of the nuclein remained constant.

The increase in phosphatic fertilizer did not cause any sensible variation in total nitrogen content. The proteid nitrogen underwent a slight increase and the nonproteid nitrogen a corresponding decrease. Of the proteid nitrogen, zein increased quite sensibly and the other proteid substances diminished.

The general conclusion is drawn that phosphatic fertilizing exercises a considerable influence on chlorophyl assimilation.

The analytical methods used are described.

Raw phosphates and green manure, S. de Grazia (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 25–31*).—This is a continuation of a report previously noted (E. S. R., 19, p. 719).

Fertilizing with raw phosphates proved as valuable to plants for green manure as slag, but superphosphate gave better results. Beans were benefited less than vetch. Application of the fertilizers (superphosphate included) at the time of turning under of the green crop gave less favorable results than when applied in two applications, at the time of sowing and at the time of turning under, and the highest returns were obtained when all the fertilizer was applied at the time of sowing.

The phosphate land question (*Engin. and Min. Jour., 87 (1909), No. 10, pp. 505, 506*).—This is a discussion based upon a statement by F. B. Weeks, formerly of the Geological Survey, and on a report of the committee of Congress on public lands explaining a proposed location law applying to western phosphate lands withdrawn from public entry by executive order (E. S. R., 20, pp. 699, 925). It is estimated in the report referred to that the available phosphate in the reserved area amounts to 1,400,000,000 tons, enough to last over 600 years at the present rate of consumption.

Mining and milling Florida phosphates, C. A. Stone (*Engin. and Min. Jour., 87 (1909), No. 10, pp. 490–492, figs. 11; abs. in Chem. Abs., 3 (1909), No. 10, p. 1198*).—A brief account is here given of the machinery and methods employed in this industry.

Lime and liming, L. L. Van Slyke (*New York State Sta. Circ. 10, pp. 12*).—This is a circular of information regarding the use of lime compounds on soils, composition of lime compounds, best forms of lime to use, ground phosphate rock or floats, and slag phosphate.

Action of calcium fluorid in leucitic soils, G. Ampola (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 20–22*).—The effect of leucite, lime, calcium fluorid, and sulphate of potash was tested singly and in combination on lupines and vetch and on potatoes following them. Lupines and vetch were used as green manure. The results showed that the addition of the fluorid caused an increase of product both in the case of the green manures and of the

potatoes. The results obtained in the cases where the fluorid was added to the leucite as compared with the cases where sulphate of potash was used in varying amounts were on the whole favorable to the combination of leucite and fluorid, but no absolute conclusion can be stated.

Horse-hoof parings (*Jour. Dept. Agr. West. Aust., 17 (1908), No. 1, p. 551*).—It is stated that this material furnishes a good manure for fruit trees and vines, especially on sandy soils where by slow decay it will yield a gradual supply of nitrogen. The material contains from 8 to 12 per cent of organic nitrogen and 6 to 10 per cent of phosphoric acid. It is recommended that the parings be thrown into a heap, sprinkled with sulphate of potash and protected from rain, and allowed to decompose for about 6 months. It will then be found to be a good manure if mixed with loam, old mortar, or unleached ashes before application.

Analyses of fertilizers sold in Maryland, H. B. McDonnell et al. (*Md. Agr. Col. Quart., 1909, No. 43, pp. 55*).—This bulletin reports the results of fertilizer inspection during the last half of 1908.

Inspection and analyses of commercial fertilizers on sale in the State, W. F. Hand et al. (*Mississippi Sta. Bul. 115, pp. 3–72*).—The results are reported of analyses of 526 samples inspected during the season of 1907–8. The pecuniary advantage of buying high grade fertilizers is set forth, and it is stated that the demand on the part of farmers for low grade mixtures is due to an incorrect idea of the actual value of fertilizers.

Analyses of fertilizers, F. W. Morse and B. E. Curry (*New Hampshire Sta. Bul. 140, pp. 237–242*).—Analyses of about 100 brands collected by the agent of the State board of agriculture are reported. Attention is called to the fact that a large number of the brands were slightly low in nitrogen.

Analyses of commercial fertilizers, B. L. Hartwell, J. F. Morgan, and L. F. Whipple (*Rhode Island Sta. Bul. 132, pp. 35–51*).—This bulletin contains analyses of samples of commercial fertilizers collected during the year 1908 not previously reported (E. S. R., 20, p. 522). The question as to whether the manufacturer should be allowed to supply an order for fertilizer constituents mixed according to a specified formula without being required to pay an additional license fee, "provided the goods are labeled with the formula according to which they were mixed," is discussed. It is held that an explicit statement of the character of the mixture "would be in effect a guaranty by the manufacturer and a protection to the purchaser."

Analyses of commercial fertilizers, J. Thompson (*Nashville, Tenn.: State Dept. Agr., 1909, pp. 51*).—This is a report of inspection of fertilizers in the State during the year ended December 31, 1908. It is stated that "the various manufacturers of commercial fertilizers sold in the State of Tennessee from December 19, 1906, to December 19, 1907, 38,794 tons; from December 19, 1907, to December 19, 1908, 46,384 tons. The year 1908 shows the largest increase ever recorded in the sales of fertilizers in this State. There has been a large increase in the sale of complete fertilizers, due largely to the trucking and tobacco interests in Tennessee."

Fertilizers, J. T. Crawley (*Estac. Cent. Agron. Cuba Bul. 14, English Ed., pp. 35*).—This bulletin is intended to be educational in character and gives the analyses of fertilizers and fertilizing materials examined at the Cuban Experiment Station during recent years, with such facts as are considered necessary to a proper understanding of the nature and use of fertilizers.

It is stated that the need of fertilizers in Cuba is already apparent and is rapidly increasing, and that planters are beginning to experiment with them to a considerable extent. Their nature and use are, however, so imperfectly understood that the station has undertaken rather extensive experiments with fer-

tilizers for sugar cane, tobacco, vegetables, and other crops in cooperation with planters in different parts of the island in order to determine the best methods of use.

The mineral industry: Its statistics, technology, and trade during 1907, edited by W. R. INGALLS (*New York and London, 1908, vol. 16, pp. X+1127, pls. 5, figs. 64*).—As usual, this annual contains chapters on phosphate rock and potassium salts, as well as on other mineral products of less agricultural value.

AGRICULTURAL BOTANY.

Department of botanical research, D. T. MACDOUGAL (*Carnegie Inst. Washington Year Book, 7 (1908), pp. 55–73, pls. 4*).—A progress report is given briefly describing the various lines of work that are being carried on by this department. Among them are studies on the general rôle of water evaporation in plant life, the physiology of transpiration in plants, the histology of hybrids, and the effects of altitude, isolation, and other climatic factors on plant growth, and experimental researches on the production of new species of plants.

Report of the botanist, A. NELSON (*Wyoming Sta. Rpt. 1908, pp. 48–50*).—A brief report is given of the work carried on by the station botanist, which included experiments with alkali and drought-resistant forage plants, tests of shade trees, ornamentals, etc.

Seeds and plants imported during the period from July 1 to September 30, 1908. Inventory No. 16 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 148, pp. 37*).—This is the sixteenth inventory of seeds and plants imported by the Office of Foreign Seed and Plant Introduction and represents for the most part material secured by correspondence in different parts of the world. About 400 numbers are included.

Vegetation affected by agriculture in Central America, O. F. COOK (*U. S. Dept. Agr., Bur. Plant Indus, Bul. 145, pp. 30, pls. 8*).—The effect of primitive agricultural conditions, as shown by the present vegetation of portions of Central America, is described.

The author states that following the repeated clearing and burning of the woody vegetation for the planting of corn, the land becomes overgrown with coarse grasses. The burning of these prevents the growth of young trees, and such processes result in the denudation of the land. The alternating processes of denudation and reforestation have continued in Central America for a long time, and it is evident that the simple operations of cutting and burning of the natural vegetation can induce desert conditions even in naturally forested tropical regions.

Studies in Trifolium, I, P. B. KENNEDY (*Muhlenbergia, 5 (1909), No. 1, pp. 1–13, pl. 1*).—Studies are reported on the species of clover belonging to the Amoria section found growing spontaneously or under cultivation in America north of Mexico.

Notes on some wild forms and species of tuber-bearing Solanums, A. W. SUTTON (*Jour. Linn. Soc. [London], Bot., 38 (1909), No. 268, pp. 446–453, pls. 12*).—A report is given on investigations conducted by the author, a preliminary notice of which has appeared (E. S. R., 20, p. 128). Since 1886 he has been carrying on experiments with different species of Solanum to determine if possible the species from which the cultivated potato is derived. Among the species first studied were *Solanum maglia* and *S. commersonii*. In addition to these, 5 wild species (*S. tuberosum, S. polyadenium, S. verrucosum, S. tuberosum boreale*, and *S. etuberosum*) have been studied. Of these all except the last flower freely and produce fruits which contain an abundance of seeds, and plants raised from the seed exhibit little or no variation from the parent plants

or among themselves. Seedlings of the common cultivated potato are known to differ widely. A study of the pollen grains showed uniformity in all the wild species in that they were practically all oval or elliptical, whereas the pollen grains of the cultivated potato are irregular in form and size.

The studies with *S. etuberosum* are reported at some length, and it appears that on account of the resistance of this species to potato blight it may be of economic value. This species was grown continuously for more than 20 years, during which time no variation was observed either in foliage or flowers. In 1906 one seed pod developed and ripened, from which 20 young plants were raised. These exhibited the same variation that is met with among the seedlings of the cultivated potato. Later a number of flowers were artificially pollinated, and the seedlings raised in 1908 exhibited the same variability in character of foliage, color of flowers, etc.

From the uniform character and shape of the pollen grain and other characteristics, the author believes that *S. etuberosum* is a primitive specific form, and that the great variability of its seedlings points to the conclusion that this may probably be the parent form of the cultivated potato.

Breeding strains of plants, C. B. DAVENPORT (*Carnegie Inst. Washington Year Book, 7 (1908), pp. 92–96*).—A progress report is given of the studies of Dr. G. H. Shull on breeding strains of plants, the lines of investigation including a large number of species, among them beans, maize, sunflowers, poppies, Lychnis, Verbascum, etc.

Among the more important results from an agricultural standpoint are those obtained with maize. During the season covered by the report 38 pedigreed strains of maize represented by about 6,500 individuals were examined, and it is stated that—

"Studies on the effects of cross- and self-fertilization in maize have given further evidence that an ordinary field of Indian corn consists of a series of more or less complex hybrids among numerous elementary species or biotypes, and that the apparently injurious effects of self-fertilization are due simply to the unfavorable comparison of pure strains with their hybrids, and of less complex hybrids with more complex ones. Self-fertilization sooner or later reduces any pedigree to the condition of a pure strain by eliminating its hybrid elements. According to this hypothesis, when the strain is once reduced to a pure state, no further deterioration should result from continued self-fertilization. All the evidences available at this time appear to support this proposition."

Brief accounts are appended on the studies of Dr. J. A. Harris on variation and correlation in wild plants, and of Miss Anne M. Lutz's cell studies in heredity.

The superiority of line breeding over narrow breeding, O. F. COOK (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 146, pp. 45*).—The purpose of this paper is to point out some of the sources of confusion which have interfered with definite scientific solutions of problems of breeding and to indicate a point of view from which contradictory opinions can be reconciled.

The author recognizes three forms of breeding, broad breeding, which is the condition of descent found in natural species and involves a free interbreeding of a large number of individuals, resulting in many lines of descent; narrow breeding, which is the condition of descent found in carefully selected varieties and embraces relatively small numbers of closely similar individuals; and line breeding, which is the condition of descent of strains descended from single individuals propagated without interbreeding with other lines of descent. Line breeding includes in-and-in breeding, self-fertilization, parthenogenesis, and vegetative propagation. The different types of breeding are discussed at some length, and the superiority of line breeding in fixing characters is pointed out.

A new case of parthenocarpus development, R. EWERT (*Jahresber. Ver. Angew. Bot., 5 (1907), pp. 83–85*).—A report is given of the finding of a series of apples in 1907 that had developed without fertilization. The fruit was heavy and of fine appearance, but was without a well-developed core, containing in its stead a few ill-formed seed without any embryos.

This led the author to a study of self-fertility among fruits and other plants. He claims that self-fertility does not exist in strawberries, raspberries, tomatoes, or currants. It occurs sparingly in the gooseberry and peach, somewhat more frequently with the cherry and grape, and is most common among apples, pears, and pumpkins.

Some aspects of the mycorrhiza problem, C. B. GRUENBERG (*Bul. Torrey Bot. Club, 36 (1909), No. 3, pp. 165–169*).—Attention is called to some of the phenomena associated with mycorrhiza, and the dependence of certain plants on mycorrhiza is pointed out. The problem is one not only of great theoretical interest, but may have important practical bearings upon the transplanting of trees, reforestation, nitrification of soils, etc.

The value of certain nutritive elements to the plant cell, H. S. REED (*Ann. Bot. [London], 21 (1907), No. 84, pp. 501–543, figs. 2*).—The author describes the results of a study upon the rôle of certain essential elements in the physiology of the plant cell, particular attention being paid to the rôle of potassium, phosphorus, calcium, and magnesium. The studies were made with filamentous algæ, the protonema of moss, prothalli of ferns, and root tips of phanerogamic plants, these being selected on account of the possibility of submitting them to microscopical examination in living condition. Nutrient solutions were prepared and the rôle of the different chemicals studied.

The algæ were found to thrive best in artificial cultures which remained neutral or slightly acid in reaction, while the phanerogams thrived best in neutral or slightly alkaline solutions.

Potash salts were found necessary for the germination and growth of certain mosses and for starch formation in all green plants studied. Mitotic cell division never took place without a suitable supply of potassium.

The lack of phosphorus seemed to be more injurious to the cells studied than the lack of any other element. Cells suffering from phosphorus starvation lose their soluble phosphorus, and later the injury extends to the living organs of the cell, finally resulting in its death. Phosphorus appears to be more closely connected with carbohydrate transformation than with its origin. In the absence of phosphorus no mitotic divisions were possible.

Calcium appears to be necessary for the activity and growth of the chlorophyll and chlorophyll-containing organs. One of its most important functions seems to be that of overcoming the bad effects of magnesium. Cell nuclei were able to divide in the absence of calcium, but the new cell walls were imperfectly formed.

Spore formation in Aspergillus was most abundant when magnesium and phosphorus were present in the ratio of the normal culture solution used. An excess of magnesium over phosphorus was detrimental to spore formation. Magnesium salts appear to be necessary for the continued health and activity of the chloroplasts. When grown in the absence of magnesium, there was no oil formed in Vaucheria, and the processes of mitosis were somewhat retarded in the nuclei of Spirogyra.

The nonliving parts of the cell, the cell wall, starch granules, oil globules, etc., are the only ones visibly modified by the lack of an essential element. The strictly living portions of the cell did not manifest any morphological changes until they were killed.

An extensive bibliography is appended to the article.

The influence of varying proportions of calcium and magnesium on the development of plants. L. Bernardini and G. Corso (*Ann. R. Scuola Sup. Agr. Portici, 2. ser., 7 (1907), pp. 16*).—A study was made of the effect of varying the proportion between lime and magnesia on a considerable number of plants.

The conclusions of Loew and various Japanese investigators are confirmed. It was found that for the development of cereals, such as wheat, rye, oats, rice, and barley, a proportion of 1:1 gives the best results; for maize, onions, spinach, flax, and cabbage, 1:2; and for Leguminosæ, 1:3.

The amounts of calcium and magnesium in plant seeds. E. Schulze and C. Godet (*Ztschr. Physiol. Chem., 58 (1908), No. 2, pp. 156–161; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 555, II, p. 83*).—The authors report analyses of the husks and kernels of various seeds, among them pine, lupine, pumpkin, castor bean, sunflower, and several nuts. They find that in general the husks contain relatively more calcium than magnesium, while the kernels are richer in magnesium than in calcium.

The calcium and magnesium content of certain seed. R. Willstatter (*Ztschr. Physiol. Chem., 58 (1909), No. 5, pp. 438, 439*).—A report is given on analyses made of the seed of a number of varieties of wheat, barley, oats, maize, rice, and buckwheat, showing the relative proportion of magnesium and calcium oxid in the flour and bran. In every instance it appears that the magnesium content was considerably higher than the lime content.

The stimulating effect of phosphoric acid on the growth of plants. H. Kühl (*Bot. Ztg., 2. Abt., 67 (1909), No. 3, pp. 33–36*).—Experiments are briefly reported in which the presence of potassium phosphate in culture solutions stimulated the production and development of colonies of soil organisms and hastened the germination of pine seed when placed between moistened cotton batting. The addition of phosphoric acid to cultures of Aspergillus, however, did not increase the rate of growth nor the total amount.

The chlorin content of leaves of plants. A. J. J. Vandevelde (*Bul. Soc. Chim. Belg., 23 (1909), No. 2, pp. 84–88*).—The author states that in general the ash of leaves increases with the age of the leaves, although there are some undoubted exceptions to this. He has made a study of a large number of species and reports the chlorin content in different periods of growth. With linden, syringa, privet, horse-chestnut, grapes, and ampelopsis the chlorin content increased regularly from May to September. With elder, hazel, and willows the content was greatest in September and least in July. With peach, plum, and species of Ribes and Rubus the chlorin reached its maximum content in July, with a minimum in May. In the leaves of Carpinus the maximum was found in July, with a minimum in September, and in oak, apple, holly, rhododendron, and ivy leaves the chlorin content decreased regularly from May to September. In the case of the leaves of Pavia, chestnut, maple, Symphoricarpus, birch, deutzia, and some others the maximum content was in May, with a minimum in July, again increasing in September.

The occurrence of betain in plants. J. Urban (*Bl. Zuckerrübenbau, 16 (1909), No. 4, pp. 51–53*).—An account is given of botanical and chemical investigations on about a dozen families of plants to determine the presence of betain. It was found to be present in all the species of Amarantaceæ and Chenopodiaceæ examined and absent in the species of Polygonum, Phytolacca, Aristolochia, Elæagnus, Cichorium, Avena, Pisum, and others.

The nutritive effect of amids on the germinating seed, the detached embryo, and the green plant. J. Lefèvre (*Compt. Rend. Acad. Sci. [Paris], 147 (1908), No. 20, pp. 535–537; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 555, II, pp. 83, 84*).—Studies were made of the germinating seed, detached embryos, and green plant of maize and pine to determine whether they can

secure their organic matter from tyrosin, leucin, oxamid, alanin, or glycerin, without being supplied with any carbon dioxid. It was found that maize will germinate and the young plants grow and increase in weight when given the above substances, while the detached embryos of pine seed will not. The embryos of the pine seed will develop, however, in a solution of sucrose.

Peptolytic ferments in germinating and ungerminated seeds, E. Abderhalden and Dammhahn (*Ztschr. Physiol. Chem., 57 (1908), No. 5–6, pp. 332–338; abs. in Jour. Chem. Soc. [London], 94 (1908), No. 554, II, p. 1065*).—The authors confirm the presence of peptolytic enzyms in germinating seeds of wheat, maize, barley, and lupines. In the resting stage, peptolytic ferments are absent.

The study of winter buds with reference to their growth and leaf content, Emmeline Moore (*Bul. Torrey Bot. Club, 36 (1909), No. 3, pp. 117–145, pls. 3, figs. 11*).—A study was made of the growth of buds in winter, a considerable number of species of plants being observed.

The author states that in some species the full number of leaves that unfold in the spring exists at the beginning of winter. In other species, the majority of leaves are present at this time, but additions occur at the time of unfolding. The terminal and axillary buds of the next summer and autumn are in many cases well organized at the approach of winter. The leaf buds of all deciduous and evergreen trees and shrubs investigated enter upon a winter resting period, the duration of which varies in the different plants. The greater warmth of an unusually mild winter was found to exercise but little influence on the growth of leaf buds, but the flower buds were found to more quickly respond to the influence of continuous high temperatures. In some of the species under investigation the leaf buds showed no change either in length or diameter until February or March, others not until April or May. The organization of additional tissues does not take place within the leaf buds during the winter, but becomes apparent in March or April. The first apparent evidence of growth is a swelling of the closely compacted tissues, and with continuous high temperatures rapid and vigorous growth follows. The leaf buds of Picea and Rhododendron exhibited the longest resting period of any examined.

The effect of the removal of showy parts of flowers on fruit and seed production, A. H. McCray (*Ohio Nat., 9 (1909), No. 5, pp. 466–469*).—Experiments are reported in which the petals were removed from the flowers of apples, nasturtiums, etc., to determine the effects of their removal on the production of fruit and consequently on seed. The general effect was to decidedly lessen the number of fruits setting where the corollas or other showy parts were removed, and the author believes that this was due to the removal of the protection offered by the petals rather than to a lack of insect visitation.

Influence of graft on some annual and perennial plants, L. Daniel (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 7, pp. 431–433*).—An account is given of a prolonged series of studies on the influence of grafting annual and perennial plants, the present paper giving the results of grafting potatoes upon tomatoes and rhizome-bearing species of Helianthus on the common sunflower.

From the experiments, which have covered a period of more than 13 years in which perennial rhizome-bearing plants were grafted upon annuals, it is shown that the stock and the graft react upon each other under certain abnormal conditions. The graft, being unable to use the stock for its reserve material, frequently forms aërial tubers. The stock, unable to serve as a storage for reserves, utilizes part of the nutritive material furnished by the graft in forming abnormal woody tissue by which it approaches in appearance the structure of perennial woody plants.

The substitution of lignification and tuber bearing, which was only occasional in the grafts of tomatoes and potatoes, was a constant occurrence when artichokes and other tuber-bearing species of Helianthus were grafted upon the annual sunflower.

Comparison between the beginning of the development of perennial and annual plants. G. André (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 8, pp. 515–517*).—In continuation of a previous note (E. S. R., 20, p. 1125), the author gives comparisons of bean and horse-chestnut seedlings during their early development.

In both the annual and perennial plants the mineral and nitrogenous materials in the cotyledons were used up during the growth of the plant in about the same proportions. The horse-chestnut was 4½ months in producing a seedling weighing as much as the seed from which it came, while the bean accomplished it in 18 days. In this period of growth there had been lost from the cotyledons of the horse-chestnut 81.2 per cent of their original phosphoric acid, 72.8 per cent of the potash, and 82.3 per cent of the nitrogen. The bean cotyledons lost about equal amounts during the corresponding 18-day period of growth.

Electrical stimulation of plant growth. A. B. Plowman (*Abs. in Science, n. ser., 29 (1909), No. 742, p. 470*).—As a result of experiments and observations extending over a period of more than 10 years, the author is convinced that electrical charges of positive sign are more or less inhibitive of the vital processes of plant protoplasm through which such charges are caused to pass, while, within a rather wide range of conditions, negative electrical charges stimulate such processes, sometimes to a remarkable degree.

The physiology of electrocultures. G. Gassner (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 1, pp. 5–7*).—A review is given of the investigations of Lemström, the author, and others on the effect of electricity on plants. The conclusion is reached that the electrical stimulus causes increased transpiration on the part of the plant, and it is believed probable that the assimilatory and respiratory functions are equally stimulated.

The relation between plant respiration and alcoholic fermentation. S. Kostytscheff (*Ber. Deut. Bot. Gesell., 26a (1908), No. 8, pp. 565–573; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 555, II, p. 84*).—The author gives an account of investigations on the respiration of plants, dealing particularly with the hypothesis that the production of alcohol is an intermediate stage in respiration. The experiments were made with peas, and seem to indicate that in respiration the plant sugar decomposes in the same way as in alcoholic fermentation, but that the reaction does not go so far as alcohol production. The intermediate substances produced during respiration are oxidized.

The chemical nature of root excretions. J. Stoklasa and A. Ernst (*Jahrb. Wiss. Bot. [Pringsheim], 46 (1908), No. 1, pp. 55–102; abs. in Bot. Gaz., 47 (1909), No. 3, pp. 249, 250*).—A study was made of the excretions of the roots of a number of plants.

The authors found that no acid, either organic or inorganic, except carbonic acid, was excreted by roots, if they were fully supplied with oxygen so that aerobic respiration was unrestrained. In limited oxygen supply, certain organic acids were formed and excreted, but in no case was any inorganic acid or salt excreted. The organic acids appearing under limited oxygen supply varied with the plants used. Buckwheat and barley gave formic and acetic acids, oats and maize formic acid, and beets oxalic acid. It is believed that these acids arise from the incompletely oxidized products of respiration and that in a full oxygen supply these acids will be oxidized into carbon dioxid and water.

The carbon dioxid excreted by the root systems of barley, oats, rye, and wheat was determined, the barley root system giving off the greatest amount of carbon dioxid and producing the greatest dry weight. The quotient arising from dividing the weight of carbon dioxid by the dry weight of the root system is least in barley and greatest in oats, and this quotient is considered an indication of the specific energy of respiration.

The authors believe that the injury to farm crops by insufficient aeration of the soil probably arises from the accumulation of the highly toxic organic acids due to the incomplete oxidation of the products of respiration.

Variation of fungi due to environment, F. L. Stevens and J. G. Hall (*Abs. in Science, n. ser., 29 (1909), No. 737, p. 273*).—Notes are given showing the effect of different densities of colonies on the same plate for 5 species of fungi. Some of these showed an entire elimination of pycnidial formation and the production of spores without covering when the plates were thickly sown.

The effects of chemicals as influencing color, growth, and character of several species of fungi are reported upon, and the changes noted are said to be often sufficient to cause the fungus to be removed from one order to another.

The effect of light on the growth, spore formation, and zonation of the colonies of several species of fungi is also reported upon.

The culture of fungi, O. Brefeld (*Untersuch. Gesamtgeb. Mykol., 1908, No. 14, pp. VIII+256*).—This volume treats of the germination of fungi, the application of culture methods to various forms of fungi, their comparative morphology, and related fruiting forms. The first part of the publication is devoted to studies on germination, methods of isolation, pure cultures, infections, etc. In the second part of the work the application of culture methods as affecting the morphology, etc., is discussed, the principal groups of fungi being treated.

Bacteria in relation to country life, J. G. Lipman (*New York, 1908, pp. XX+486, pl. 1, figs. 71*).—The general purpose of this book, as concisely set forth by the author, is "to treat, in a simple way, of the bacteria as they concern life in the country. It is an attempt to discuss the character of the bacteria in air, water, sewage, manure, soil, and food products." It is stated that "technical terms and expressions have been eliminated as far as practicable," and the hope is expressed "that the general reader may find the book an aid in the understanding of the bacteriological problems as they affect the daily tasks on the farm."

The book discusses in a complete and comprehensive way the structure and growth of bacteria and the various rôles they play in relation to air and water, sewage, soil fertility, barnyard manure, milk and milk products, and fermentation. A valuable feature of the book, particularly for the nonscientific reader, is a combined glossary and index.

A bibliography of mycological literature, G. Lindau and P. Sydow (*Thesaurus litteraturæ mycologicæ et lichenologicæ ratione habita præcipue omnium quæ adhuc scripta sunt de mycologia applicata. Leipsic, 1908, vol. 2, pt. 1, pp. 320*).—This publication is a continuation of the previous number (E. S. R., 20, p. 827), the titles listed being those of authors as far as Puriewitsch. The total number of papers to the conclusion of the present number is 21,475.

FIELD CROPS.

[Report of the botanist], J. J. Thornber (*Arizona Sta. Rpt. 1908, pp. 351–356*). The conditions upon the range in connection with the range improvement work, previously described (E. S. R., 19, p. 1134), are discussed. The precipitation on the small range reserve tract for the year ending June 30, 1908,

amounted to 14.11 in., or about 3 in. above the average. From July to October, inclusive, 9.74 in., and from November to April, inclusive, 4.13 in., fell, while May and June were practically rainless.

The summer annual growth was heavy, *Bouteloua aristidoides* and *B. polystachya* being especially abundant. In favorable places this growth was at the rate of 500 to 1,200 lbs. of dried forage per acre. Among creosote bushes (*Covillea tridentata*) and on shallow soil the growth was only one-fifth to one-third as heavy. This result is considered due to the amounts of soil moisture taken up by the creosote bushes and other shrubs. As in the two preceding seasons the winter annual growth was light on account of insufficient rainfall, only 0.28 in. being received after March 1. It is stated that perhaps no single factor has a greater influence on the distribution and abundance of the native vegetation than that of moisture.

The planting of native economic cacti was continued with the following varieties: *Opuntia fulgida, O. mamillata, O. spinosior, O. arbuscula, O. engelmanni,* and *O. phæacantha.* It was shown that cuttings of the native species need not be wilted before planting to prevent rotting. Both cuttings and mature plants made little growth until the summer rains set in.

Saltbush work for practical results was a failure. Planting seeds of the more valuable native and Australian species did not meet with much success. The best results were secured with Australian saltbush (*Atriplex semibaccata*), but the growth was insufficient for economic purposes. The author states that if cultivation and irrigation have to be employed, alfalfa would be a much more profitable crop than the saltbush.

With reference to sowing seeds on lands submerged from 2 to 6 weeks by the annual rise of the Colorado River, it was found that about 45 per cent of the seed of amber cane or common sorghum germinated even after 50 days of submergence. "None of the varieties of forage, as African red top cane, dwarf milo maize, Jerusalem corn, white Kafir corn, German millet, or pearl millet can be depended upon to endure submergence for any considerable time. Japanese and Honduras rice seed began growth under water and continued until the soil became quite dry. Neither Johnson grass nor Bermuda grass seed could be destroyed with continuous submergence of 50 days."

A note is also given on observations of resistant eucalypts.

[The relation of] composition of soil to composition of plants, H. G. Knight, F. E. Hepner, and F. A. Smith (*Wyoming Sta. Rpt. 1908, p. 44*).—In 1906 two small plats at Laramie were sown with barley. One of these plats received nitrate of soda as a fertilizer. The analysis of the crop from both plats is shown in the following table:

Composition of barley grown on soil treated with nitrate of soda and on unfertilized soil.

	Fertilized plat.		Unfertilized plat.	
	Air-dry.	Water-free.	Air-dry.	Water-free.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Water	10.87	.....	11.31	.....
Protein	9.61	10.78	7.86	8.86
Fat	1.97	2.21	1.87	2.11
Nitrogen-free extract	73.66	82.64	74.83	84.37
Crude fiber	2.20	2.47	2.43	2.74
Ash	1.69	1.90	1.70	1.92

Wyoming forage plants and their chemical composition, H. G. KNIGHT, F. E. HEPNER, and F. A. SMITH (*Wyoming Sta. Rpt. 1908, pp. 33–43*).—The investigations herein reported have been previously noted (E. S. R., 20, p. 135).

Results of cooperative tests of varieties of corn, wheat, oats, soy beans, and cowpeas, 1908, A. T. WIANCKO and C. O. CROMER (*Indiana Sta. Bul. 132, pp. 469–500, fig. 1*).—In 1908, 422 tests of 5 varieties of corn, 85 of 5 varieties of winter wheat, 55 each of 4 varieties of oats and 4 varieties of soy beans, and 70 of 4 varieties of cowpeas, in all 773 tests, were made on more than 700 farms throughout the State including every county. Tables are given showing the results of each test. The general plan of these experiments was described in a previous bulletin (E. S. R., 19, p. 1029).

The varieties of corn producing the highest average yields per acre in 1908 in each section of the State were the following: Sections 1 and 2 Silver Mine, 43.8 and 65.1 bu., respectively; sections 3 and 4 Reid Yellow Dent, 56.8 and 57.4 bu., respectively; sections 5, 6 and 7 Boone County White, 48.4, 52.8, and 49.1 bu., respectively; section 8 Leaming, 43.7 bu.; and sections 9, 10, 11 and 12 Johnson County White, 44.2, 51, 44.8, and 40.4 bu., respectively. Early Yellow Dent, apparently the earliest variety under test, required 109 days to mature in sections 1 and 2 and 104 days in sections 3 and 4. The latest variety was Johnson County White, which required about 133 days to reach maturity in section 8, and together with Vogler White Dent about 126 days in sections 9, 11, and 12 and about 128 days in section 10.

Four lots of the 5 varieties of winter wheat were tested. The leading varieties and their average yields per acre for 1908 were as follows: Lot 1, Egyptian Amber, 21 bu.; lot 2, Pride of Indiana, 19.3 bu.; lot 3, Michigan Amber, 18.4 bu.; and lot 4, Rudy and Gold Coin each yielding 13.6 bu.

The average yields of the 4 varieties of oats tested were as follows: Great Dakota 27 bu., Swedish Select 27.2 bu., Silver Mine 28.01 bu., and Great American 30.5 bu. The authors are not certain as to the identity of Great Dakota and Silver Mine.

The following average yields of grain and hay per acre were secured from soy beans: In northern Indiana, Ito San, 15.8 bu. of grain and 2,087 lbs. of hay; Early Brown, 15.6 bu. of grain and 1,985 lbs. of hay; Hollybrook, 12.5 bu. of grain and 2,421 lbs. of hay; and Dwarf Early Yellow, 13 bu. of grain and 2,028 lbs. of hay; in southern Indiana, Ito San, 13.1 bu. of grain and 1,452 lbs. of hay; Early Brown, 12.1 bu. of grain and 1,407 lbs. of hay; Hollybrook, 10.6 bu. of grain and 1,464 lbs. of hay; and Medium Early Yellow, 10.6 bu. of grain and 1,514 lbs. of hay.

Cowpeas gave the following average yields per acre: In northern Indiana, Early Blackeye, 11.4 bu. of grain and 3,344 lbs. of hay; Michigan Favorite, 9.3 bu. of grain and 3,149 lbs. of hay; Whippoorwill, 10.1 bu. of grain and 3,517 lbs. of hay; and New Era, 12.1 bu. of grain and 4,327 lbs. of hay; in southern Indiana, Early Blackeye, 11.8 bu. of grain and 2,878 lbs. of hay; New Era, 11 bu. of grain and 3,158 lbs. of hay; Iron, 9.4 bu. of grain and 3,444 lbs. of hay; and Clay, 4.4 bu. of grain and 3,134 lbs. of hay.

[**Variety tests with barley, oats, and wheat**], L. B. MCWETHY (*Wyoming Sta. Rpt. 1908, pp. 53, 54*).—The results with the different crops are given in tables. The leading variety of barley, No. 0, yielded 42.43 bu. per acre, being followed by No. 167 with 42.41 bu. Black Beauty, a side oat with black grain, ranked first with a yield of 54.82 bu. per acre, Kherson standing second with 50.94 bu. Kherson was from 4 to 6 days earlier than the other varieties. Of 4 varieties of wheat, the durum was earliest and gave the best yield.

Results obtained in 1908 from trial plats of grain, fodder corn, field roots, and potatoes, W. and C. E. SAUNDERS (*Canada Cent. Expt. Farm Bul. 61, pp. 54*).—The results secured in variety tests at the seven Dominion experimental farms are reported in tables with brief comments. In general the varieties are arranged in the order of their average yields for the last 5 years.

The varieties ranking first and the average yields per acre for 5 years at the Central Experimental Farm at Ottawa were as follows: Bishop spring wheat, 31 bu. 36 lbs.; Twentieth Century oats, 81 bu. 24 lbs.; Nugent six-rowed barley, 56 bu. 6 lbs.; Swedish Chevalier two-rowed barley, 49 bu. 26 lbs.; Prussian Blue peas, 36 bu. 52 lbs.; Eureka ensilage corn, 24 tons, 312 lbs.; Perfection Swede turnips, 31 tons 657 lbs.; Prize Mammoth Long Red mangels, 33 tons, 1,873 lbs.; Improved Short White carrots, 26 tons, 252 lbs.; Vilmorin Improved sugar beet, 23 tons, 429 lbs.; and Dooley potato, 268 bu. 24 lbs.

The corresponding data at the experimental farm at Nappan were as follows: White Russian spring wheat, 32 bu. 24 lbs.; Siberian oats, 68 bu. 10 lbs.; Mansury six-rowed barley, 45 bu. 4 lbs.; Danish Chevalier two-rowed barley, 51 bu. 40 lbs.; Arthur peas, 27 bu. 20 lbs.; Eureka ensilage corn, 21 tons, 372 lbs.; Jumbo turnips, 33 tons, 736 lbs.; Yellow Intermediate mangels, 28 tons, 1,775 lbs.; White Belgian carrots, 17 tons, 853 lbs.; Wanzleben sugar beets, 14 tons, 1,917 lbs.; and Vicks Extra Early potato, 443 bu. 5 lbs.

The following varieties produced the highest average yield for 5 years at the experimental farm at Brandon: Preston spring wheat, 42 bu. 18 lbs.; Improved American oats, 123 bu. 29 lbs.; Odessa, six-rowed barley, 63 bu. 40 lbs.; Swedish Chevalier two-rowed barley, 60 bu. 24 lbs.; Mackay peas, 56 bu. 58 lbs.; Longfellow ensilage corn, 22 tons, 722 lbs.; Good Luck turnips, 31 tons, 93 lbs.; Prize Mammoth Long Red mangles, 32 tons, 891 lbs.; Improved Short White carrots, 24 tons, 1,896 lbs.; Wanzleben sugar beets, 22 tons, 352 lbs.; and Late Puritan potato, 569 bu. 48 lbs.

Similar data at the experimental farm at Indian Head were as follows: White Fife spring wheat, 39 bu. 40 lbs.; Banner oats, 117 bu. 7 lbs.; Stella six-rowed barley, 60 bu. 40 lbs.; Standwell two-rowed barley, 59 bu. 1 lb.; Golden Vine peas, 38 bu. 4 lbs.; Angel of Midnight ensilage corn, 14 tons, 1,700 lbs.; Hall Westbury turnips, 24 tons, 687 lbs.; Giant Yellow Intermediate mangels, 22 tons, 1,482 lbs.; Ontario Champion carrots, 14 tons, 846 lbs.; Vilmorin Improved sugar beets, 12 tons, 871 lbs.; and Reeves Rose potato, 385 bu. 7 lbs.

At the Lethbridge Experimental Farm at Alberta the crops were grown with and without irrigation in 1908. Dry farming methods were practiced where no water was applied to the crops. The leading varieties and their yields on unirrigated land were as follows: Turkey Red (No. 380 from Kansas) winter wheat, 53 bu. 4 lbs.; Percy A spring wheat, 35 bu.; Improved American oats, 85 bu. 15 lbs.; Blue Long Head six-rowed barley, 56 bu. 42 lbs.; Swedish Chevalier two-rowed barley, 55 bu. 20 lbs.; Paragon peas, 21 bu. 53 lbs.; North Dakota White ensilage corn, 7 tons, 1,840 lbs.; Kangaroo turnips, 10 tons, 1,648 lbs.; Gate Post mangels, 13 tons, 1,984 lbs.; Giant White Vosges carrots, 10 tons, 1,186 lbs.; Kleinwanzleben sugar beets, 10 tons, 770 lbs.; and Empire State potato, 138 bu. 36 lbs.

Under irrigation the following varieties stood first in yield: Chelsea spring wheat, 44 bu. 20 lbs.; Improved American oats, 88 bu. 18 lbs.; Claude six-rowed barley, 59 bu. 38 lbs.; Standwell two-rowed barley, 70 bu.; Victoria peas, 25 bu. 40 lbs.; Pride of the North ensilage corn, 14 tons, 160 lbs.; Gate Post mangels, 19 tons, 1,864 lbs.; Ontario Champion carrots, 16 tons, 868 lbs.; French Very Rich sugar beets, 14 tons, 1,601 lbs.; and Early Manistee potato, 453 bu. 12 lbs.

The results reported by the experimental farm at Lacombe, Alberta, include average yields of spring wheat, oats, barley, turnips, mangels, carrots, and sugar beets for only 2 years, and the yields of peas, corn, and potatoes for only 1 year. The leading varieties and their yields were as follows: Bishop spring wheat, 38 bu.; Pioneer oats, 110 bu. 25 lbs.; Mansfield six-rowed barley, 65 bu. 30 lbs.; Invincible two-rowed barley, 47 bu. 9 lbs.; English Grey peas, 16 bu.; Longfellow ensilage corn, 11 tons, 880 lbs.; Hartley Bronze turnips, 28 tons, 760 lbs.; Giant Yellow Intermediate mangels, 27 tons, 60 lbs.; Improved Short White carrots, 22 tons, 1,028 lbs.; French Very Rich sugar beets, 14 tons, 1,920 lbs.; and Ashleaf Kidney potato, 266 bu. 25 lbs.

The most productive varieties and their average yields for 5 years at the experimental farm at Agassiz were as follows: Stanley spring wheat, 30 bu. 10 lbs.; Abundance oats, 76 bu. 12 lbs.; Mansury six-rowed barley, 51 bu. 20 lbs.; Standwell two-rowed barley, 50 bu. 28 lbs.; Early Britain peas, 46 bu. 2 lbs.; Pride of the North ensilage corn, 18 tons, 1,290 lbs.; Carter Elephant turnips, 24 tons, 437 lbs.; Yellow Intermediate mangels, 20 tons, 1,674 lbs.; Giant White Vosges carrots, 28 tons, 1,275 lbs.; Vilmorin Improved sugar beets, 17 tons, 964 lbs.; and Late Puritan potato, 532 bu. 50 lbs.

Results of competitions in standing field crops, J. L. Wilson (*Ann. Rpt. Agr. Soc. Ontario, 1908, App., pp. 3–21*).—The results of growing the more important field crops in competition as a means for promoting the production of a high-class quality of seed, grain, and roots are reported in tabular form. In 1908 each society was limited to the selection of one crop to be grown in competition. The minimum size of plat for grain crops was 5 acres and for beans and potatoes 1 acre. The total number of individual competitors in the various crops was 650, divided as follows: Oats, 510; corn, 41; barley, 33; goose wheat, 25; pea beans, 22; and potatoes, 19. The acreage entered, in round figures, was 6,000 acres.

[Experimental work with field crops in Trinidad], J. H. Hart (*Bot. Dept. Trinidad Ann. Rpt. 1908, pp. 13, 14*).—Brief notes are given on the culture of tobacco, sugar cane, Manila hemp, and ramie. Sunflower cotton, an American variety, seems more suited to Trinidad conditions than Sea Island cotton, suffering less from fungus disease and insect attacks. The yield of lint during an unfavorable season was at the rate of 160 lbs. per acre.

[Experiments with oats and barley], R. B. Greig (*Aberdeen and No. of Scot. Col. Agr. Bul. 11, pp. 15*).—In a variety test with oats the following average returns per acre from 10 plats were secured: Thousand Dollar 72.25 bu., Banner 69 bu., Abundance 66 bu., Potato 61.50 bu., and Universal 56.75 bu. Potato gave the most straw. Thousand Dollar on the whole showed a smaller proportion of light grain than the other varieties, and Banner and Potato the largest proportion. Potato, which required 180 days for growth, was nearly 2 weeks later than Universal (167 days), a week later than Thousand Dollar and Abundance, and 2 days later than Banner.

In another series of tests, large seed produced 50.5 bu. of large grain, 360 lbs. of light grain, and 44 cwt. of straw, and small seed 52.125 bu. of large grain, 520 lbs. of light grain, and 41 cwt. of straw per acre.

The results of over 80 milling tests of oats indicated the following classification of the varieties tested with reference to their milling value, if the season is good and conditions similar: First class, Sandwich; second class, Sandy, Scots Birlie, Abundance, Newmarket, and Thousand Dollar; third class, Banner, Siberian, and Potato; fourth class, Tartar King and Storm King.

In a test of 8 varieties of barley, Danish Archer ranked first in productiveness with a yield of 43 bu. of total grain, 47 lbs. of light grain, a weight of 54.5 lbs. per bushel, and a straw yield of 23.75 cwt. per acre.

Alfalfa in Oklahoma. L. A. MOORHOUSE and W. L. BURLISON (*Oklahoma Sta. Bul. 82, pp. 3–29, figs. 8*).—The history of alfalfa in the United States is reviewed, the principal strains and varieties are described, and the advantages and requirements of the crop are pointed out.

In experiments with barnyard manure as a top-dressing for alfalfa it was found that this treatment increased the yield but also encouraged the growth of crab grass. The increase in yield is considered due largely to the absorption and storage of greater quantities of moisture in the manured than in the unmanured land. Three plats had been in sorghum the year before the alfalfa was sown. One plat was manured before the ground was plowed and this treatment was also noticeable in the results. The fourth plat, which had been in oats, was fallowed with frequent cultivation during the summer and the alfalfa was sown in the fall. The first 2 years this plat, owing to a better and more uniform stand, gave much heavier yields than the other spring-sown plats. On several acres of clay loam upland underlaid with hardpan the station has secured an average yield of cured hay of 2.88 tons per acre from 1902 to 1905, inclusive. Five cuttings were made each year except one, and two-thirds of the total crop was obtained in the first two cuttings.

The results of pot-culture tests show that the use of lime on upland and bottom soils apparently gave a considerable increase in growth, although in practice it has not been found necessary to lime the land in starting the crop.

Inoculation and lime as factors in growing alfalfa. H. A. HARDING and J. K. WILSON (*New York State Sta. Bul. 313, pp. 51–75, pls. 2, maps 2*).—This bulletin presents the results of cooperative experiments conducted to determine the effect of inoculation and of lime as well as the combined influence of these two factors in growing alfalfa in different parts of the State.

In 1907 inoculating soil from the station alfalfa field was applied at the rate of 200 to 300 lbs. per acre just before sowing the seed. On all plats receiving fresh inoculating soil inoculation was present except in one instance, where soil stored in a dry place for 3 months was used. By including in the summary the work along this line carried out in 1905 and 1906 it is shown that only 25 of 103 test fields produced a successful crop without inoculating soil, and that of the adjoining plats treated with inoculating soil 66 gave satisfactory yields of alfalfa. These results represent one or more fields in 39 of the 61 counties of New York. The use of inoculating soil raised the chance of success to about 60 per cent.

In nearly all of the tests with lime 1,500 lbs. of stone lime was used per acre. During the 3 years, 1905–1907, liming was tried on 64 alfalfa fields, in 54 of which an improvement apparently due to the treatment resulted. Of the unlimed plats only 11 gave successful yields, while of the limed plats adjoining 27 produced successful crops. The use of lime alone increased the number of successful fields by 25 per cent and all the fields successful without lime were improved by its use. The litmus test as a means of determining whether or not a soil needs lime was not found very reliable.

The effect of inoculating the soil and also applying lime was studied in 65 tests, in which only 12 of the untreated check plats gave satisfactory crops of alfalfa while of the limed and inoculated plats adjoining 50 gave successful yields. This treatment raised the chance of success from 18 per cent on the check plats to 77 per cent on the limed and inoculated plats.

Two factors favoring success with alfalfa, F. H. HALL (*New York State Sta. Bul. 313, popular ed., pp. 6*).—A popular edition of the above.

Questions of Wyoming crops. H. T. NOWELL (*Wyoming Sta. Rpt. 1908, pp. 75–85*).—A series of letters from farmers located in different parts of the State

is reproduced to show the conditions of alfalfa culture and that of other crops under irrigation in various sections and its possibilities.

Corn and cotton experiments for 1908, W. C. WELBORN (*Texas Sta. Bul. 120, pp. 3–16*).—Three acres well fertilized for cotton in 1907 were prepared in three different ways during the winter for corn in 1908. The first acre plat, listed 5 in. deep on the old cotton middle, produced 33.15 bu., the second, bedded on center furrow 6 in. deep, produced 31.85 bu., and the third, flat broken 6 in. deep, 33.8 bu. Fertilizer tests with corn were vitiated, but the results brought out that corn, sorghum, and crab grass all on the same land in one season tend to reduce the yield of a following corn crop. In an ear-row test in which 4 rows were planted from each ear the average percentage of difference in yield between the highest and lowest rows from each ear was 27 per cent. These results lead the author to doubt the value of the ear-row method of testing corn and he states that the individual grain is the unit and not the individual ear.

A comparative test was made of a number of varieties of corn exhibited at the State Fair, of corn selected by the ear-row method at the station, and of crib selected seed of unknown breeding. Poor stands of all were secured and the replants did poorly. The home-grown varieties gave the better stand, but the yields of all were low. Of the 32 varieties of corn exhibited only one showed a material increase in yield over the home-grown corn.

Different methods of preparing land for cotton resulted in no material difference in yield. In 3 tests of each method the following average yields of seed cotton per acre were secured: With center furrow 800 lbs., without center furrow 797 lbs., with plowing 3 in. deep 793 lbs., and with plowing 6 in. deep 815 lbs. The results of fertilizer tests with cotton are not considered very decisive. The use of 200 lbs. of acid phosphate was practically as effective as when 15 lbs. of nitrate of soda and 75 lbs. of cotton-seed meal had been given in addition and 200 lbs. of acid phosphate with 100 lbs. of cotton-seed meal gave better yields apparently than the complete application. The greatest increase in yield was derived from the use of about 250 lbs. of dried ground cow manure per acre applied with 175 lbs. or 190 lbs. of acid phosphate.

Varieties were compared in 12 one-acre fields by growing several varieties, always including Bennett Selection. Bennett Selection gave an average of 282 lbs. of lint in all fields, the value of the lint at 8½ cts. per pound together with the seed being $26.93 per acre. Excelsior grown in but one field gave a return of $5.31 more than Bennett Selection in that field and Yellow Bloom in the same field surpassed it by 38 cts. One lot of King seed gave better and another lot poorer results than Bennett Selection. Early Prolific, Cook Improved, Boyett Gin Run, Toole, and Schley gave smaller yields than Bennett Selection. Notes on large bolls, earliness, percentage of lint, thick and thin seeding and planting are given.

Local fertilizer experiments with cotton in 1905, 1906, 1907, and 1908, J. F. DUGGAR (*Alabama College Sta. Bul. 145, pp. 25–78*).—This bulletin reports the results of cooperative fertilizer tests on cotton carried out on the principal types of soil of the State. These reports represent 10 tests made in 1905, 13 in 1906, 10 in 1907, and 22 in 1908. The rainfall during the 4 years ranged from 48.16 in. in 1908 to 56.56 in. in 1906, with an average of 51 in. The fertilizer applications per acre included 200 lbs. of cotton-seed meal, 240 lbs. of acid phosphate and 100 or 200 lbs. of kainit, alone and in the various combinations. The results of each individual test are given, together with the average increase apparently due to the use of each one of the substances.

The highest average increase in seed cotton secured with cotton-seed meal in all the tests was 478 lbs. per acre on gray soil with red subsoil. This result

was obtained in 1908, but in 1907 in this same experiment the average increase was only 269 lbs. The best average increase in yield of seed cotton from the use of acid phosphate was 687 lbs., secured in 1905 on dark gray sandy soil with light colored clay subsoil. Kainit gave its greatest increase, 389 lbs. per acre, on gray sandy soil with yellow loam subsoil in 1906.

The results show considerable variation and no general conclusions are drawn. As a rule, however, the complete applications gave the best returns, with the combinations of two substances ranking next.

Varieties of cotton, 1908, W. R. PERKINS (*Mississippi Sta. Bul. 116, pp. 6*).—The yields of varieties of cotton tested in 1908 are shown in a table and notes on some of the principal varieties are given.

Of 20 varieties compared the following, given in decreasing order of total value of lint and seed per acre, were the leading varieties: Cleveland Big Boll, Cook Improved, Smith Double Header, Russell Big Boll, McKay July, and Excelsior. The value of the total crop produced per acre ranged from $115.33 to $79.11, or a difference of over $35 per acre. These varieties were grown on first class bottom loam, which received a good application of barnyard manure in 1904, was in small fruit till May, 1907, when it was sown to cowpeas which were turned under the following winter. The soil and the cultivation given are considered of greater importance in the production of the heavy yields than the varieties.

Cotton culture in Mississippi, W. L. HUTCHINSON (*Mississippi Sta. Bul. 117, pp. 6*).—This bulletin discusses briefly the methods to be employed in areas infested with the boll weevil for the successful growing of cotton in Mississippi.

It is pointed out that the essential feature is the production of the crop in 100 to 120 days during the first part of the season. "Success depends essentially on good tillage, proper fertilization, the planting of good seed of a good early variety of cotton as soon as weather conditions are favorable, and properly cleaning up the farm of hibernating places for the weevils during the winter months."

Notes on soil preparation, fertilization, planting, and cultivation are given and Cleveland Big Boll, Cook Improved, Russell Big Boll, Triumph, Smith Double Header, Prize, King Improved, and Toole are mentioned as suitable varieties.

[Work in agriculture], R. W. CLOTHIER (*Arizona Sta. Rpt. 1908, pp. 339, 340*).—A report is presented on attempts to introduce cotton culture into Arizona, and a brief note on the possibilities of dry farming is given.

At Arlington, 105 acres of short staple, 3 acres of Allen Improved long staple, and 19 acres of Mit-afifi Egyptian cotton were planted in 1908. At the station farm the same varieties and Rogers Big Boll were planted on 3 plats of heavy adobe and on 3 plats of lighter soil. Irrigation, considered necessary after planting, was given but resulted in a failure to secure a stand on the adobe soil. On the lighter soil the Egyptian cotton had a stand of 25.4 per cent, Allen Improved long staple of 34.1 per cent, and Rogers Big Boll of 25.1 per cent. The Egyptian cotton yielded 758 lbs. of seed cotton per acre, Allen Improved long staple 992 lbs., and Rogers Big Boll 1,355 lbs.

Suppressed and intensified characters in cotton hybrids, O. F. COOK (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 147, pp. 27*).—The observations discussed in this bulletin are summarized as follows:

"In hybrids between the Kekchi cotton and United States Upland varieties the bractlets are suppressed and the lint shortened, while in hybrids between Kekchi and Egyptian cotton the bractlets are enlarged and the lint is notably improved in length and quality. In the first generation of the Egyptian hybrids the intensification of the characters which gives superiority to the lint is so

regular that it may be possible to utilize it in the commercial production of high-grade fiber.

"Suppression and intensification of characters are most pronounced in the first generation and tend to disappear in later generations. This fact stands in the way of the breeding of hybrid types with permanently intensified characters, but does not interfere with the commercial production of cotton from first-generation hybrids, if hybrid seed can be obtained in sufficient quantities.

"It has become apparent in experiments that large proportions of hybrid seed can be obtained by planting two types of cotton close together and allowing the bees to cross-fertilize the flowers. It also appears practicable to raise fields of hybrid plants by sowing seed of Kekchi plants cross-fertilized with Egyptian pollen. The Kekchi seedlings can be easily recognized and removed, leaving only the hybrids to mature.

"Such a method of producing cotton from first-generation hybrids is brought within the range of practicability in Arizona by the unusual abundance and activity of cross-fertilizing insects and by the dry climate, which enables the growth and fertility of the plants to be definitely controlled by careful irrigation. The superior quality of the hybrid cotton . . . will also justify the use of special methods of breeding and cultivation."

Report of progress in variety tests of oats, C. WILLIS (*South Dakota Sta. Bul. 110, pp. 421–450, figs. 2*).—This bulletin presents the records of the work with oats begun in 1899.

The seed of nearly all the varieties mentioned was furnished by the Bureau of Plant Industry of this Department. The mechanical analysis of the soil is reported and the behavior of the different varieties under test is described. In 1908, 42 varieties were grown, but the season was unfavorable and the yields varied from 1.5 to 63.7 bu. per acre. The principal results are summarized in the following table:

Comparative yield of varieties of oats.

Variety.	Years grown.	Average yield per acre.	Variety.	Years grown.	Average yield per acre.
		Bu.			*Bu.*
Sixty Day	7	62.50	Belyak No. 10269	5	28.84
Swedish Select	9	43.79	American Triumph No. 162	6	28.78
North Finnish Black	5	41.67	American Beauty No. 163	6	28.68
Tobolsk	9	35.91	Banner No. 160	6	28.64
Columbus No. 156	6	33.22	Holstein Prolific No. 158	6	28.02
Bavarian No. 150	5	30.77	Wide Awake	6	27.04
Lincoln No. 151	6	29.78	White Tartar	4	24.22
Abyssinian No. 155	6	29.62	White Schonen No. 153	5	23.08
Golden Beauty No. 159	6	29.30	Sparrowbill No. 443	4	16.95

The meteorological records for the different seasons are tabulated, and brief notes are given on oat smut and its treatment.

The rice industry in Hawaii, F. G. KRAUSS (*Honolulu Chamber Com. Ann., 1908, pp. 111–114*).—This article is a brief description of the present state of the rice industry in the Hawaiian Islands. Statistics with reference to mills and their capacity, as well as imports and exports of rice to and from Hawaii, are included.

Sisal in Hawaii, W. WEINRICH, Jr. (*Honolulu Chamber Com. Ann., 1908, pp. 119, 120*).—This article contains a brief review of the sisal industry in the Hawaiian Islands. The author states that the industry deserves greater attention, inasmuch as it has been shown that the quality of fiber produced in Hawaii

leads the world and that it can be produced at a good profit. The product of 1907–8 is estimated at amounting to 150 tons, valued at $18,000.

Phosphoric acid consumption of the beet plant during the first year of its growth, K. Andrlík and J. Urban (*Ztschr. Zuckerindus. Böhmen, 33 (1908), No. 2, pp. 83-94*).—The results of cooperative tests with reference to this problem are tabulated and discussed.

The average results of the several experiments show that a yield of 4,000 kg. of beets produced under normal conditions required from 51.7 to 87.8 kg. of phosphoric acid, while when grown under abnormally dry conditions only 48.6 kg. were used. The same kind of seed showed a different phosphoric acid consumption by the plants in different seasons. The plants from Nimburg seed used from 51.7 to 69 kg. of phosphoric acid per hectare, while seed from another source used from 67.5 to 86.3 kg.

The quantity of phosphoric acid consumed in the production of 100 parts of sugar varied with the character of the seed, the soil, and the weather. In 1902, 100 parts of sugar required the consumption of 0.71 of a part of phosphoric acid; in 1903, 0.97 of a part; in the dry season of 1904, 0.68 of a part; and in 1905, 1.15 and 1.27 parts, the average for all tests being 0.95 of a part. The root contained an average of 48.04 per cent of the total phosphoric acid taken up by the plant, the range being between 41.7 and 60.9 per cent. As a rule when large quantities of this nutrient were taken up its proportion in the root was reduced.

Third report on the influence of manures on the yield of timothy hay, J. A. Bizzell and J. O. Morgan (*New York Cornell Sta. Bul. 261, pp. 259–276, figs. 22*).—This bulletin constitutes the third report on experiments begun in 1903 and previously noted (E. S. R., 17, p. 461; 18, p. 933).

In 1907 the apparent increase in yield of hay was largest on the plat which received 20 tons of barnyard manure per acre on September 16, 1903, and October 2, 1906. This increase amounted to 6,490 lbs. per acre, a plat treated in 1906 and 1907 with 320 lbs. of acid phosphate, 80 lbs. of muriate of potash, and 640 lbs. of nitrate of soda per acre standing second with 5,413 lbs., and a plat treated with 10 tons of barnyard manure in 1903 and 1906 being third with 4,390 lbs. The average yield of hay on 8 untreated plats for the 3 years, 1905–1907, was 2,901 lbs. per acre, on 3 plats receiving only mineral fertilizers 4,283 lbs., on 7 plats receiving nitrogen as nitrate of soda with or without mineral fertilizers, 5,635 lbs., and on 2 plats receiving nitrogen in barnyard manure 6,193 lbs. The relative apparent influence of the different fertilizer applications is shown in the following table:

Apparent increases in yield due to the different fertilizing elements.

Number of plats.	Fertilizing elements.	Apparent increase in yield of hay per acre.			Average of 3 years.
		1905.	1906.	1907.	
		Lbs.	*Lbs.*	*Lbs.*	*Lbs.*
1	Nitrogen	1,216	1,723	696	1,211
1	Phosphorus	607	417	1,023	682
1	Potassium	954	1,224	786	988
1	Nitrogen and phosphorus	1,573	2,126	1,143	1,614
1	Nitrogen and potassium	1,900	2,470	1,876	2,082
1	Phosphorus and potassium	510	1,780	947	1,079
4	Nitrogen, phosphorus, and potassium	2,613	3,543	3,535	3,230
2	Farm manure, 10 and 20 tons	3,310	3,475	5,440	4,075

The plats receiving mineral fertilizers only, especially the one treated with potash alone, produced a rank growth of alsike clover which was not noticeable

when nitrogen was added. Among the complete applications the one consisting of 320 lbs. of nitrate of soda, 80 lbs. of muriate of potash, and 320 lbs. of acid phosphate per acre gave better returns than the applications in which other proportions of nitrogen and phosphorus were used.

The seasonal influences on the yield were observed and are discussed. During the favorable seasons the total yield, and also the apparent increase due to fertilizers, was greater than in the unfavorable season of 1905. When the fertilizing materials were added singly the resulting percentage increase gradually decreased with but one exception. When the ferilizers were added in combinations of two this tendency was less marked, while the complete fertilizers showed very strongly the opposite tendency. A computation of the net gains for the 3 years shows that 20 tons of barnyard manure gave $84.59 profit per acre, 10 tons of manure $50.62, and 320 lbs. each of nitrate of soda and acid phosphate with 80 lbs. of muriate of potash $40.76.

Lime on this Dunkirk clay loam soil did not give an increased yield of timothy hay. Suggestions on fertilizing for timothy, based on the results of this work, conclude the bulletin.

Experimental field work in 1906–7, E. T. Drake (*Victorian Yearbook, 28 (1907–8), pp. 605–609*).—Brief notes on various lines of work are given. In variety tests with wheats Federation ranked first with 43 bu. per acre, followed in decreasing order of yield by Dart Imperial, Australian Talavera, Jade, Sussex, Silver King, Tarragon, White Tuscan, Frampton, and Marshall No. 3. In two localities ordinary bare fallow produced more wheat per acre than subsoil fallow, but in one region subsoil fallow exceeded the yield on bare fallow each year.

Report of the fourth annual meeting of the Canadian Seed Growers' Association (*Canad. Seed Growers' Assoc. Rept., 4, (1908), pp. 100*).—The minutes of the fourth annual meeting of the organization are reported and the papers and addresses presented and reproduced. The subjects under discussion related mainly to plant improvement for various purposes.

HORTICULTURE.

American varieties of beans, C. D. Jarvis (*New York Cornell Sta. Bul. 260, pp. 153–255, pls. 17*).—This bulletin contains a key together with complete descriptions, synonyms, and historical and comparative notes on the varieties of beans now grown in America. The key is based upon the form and color of the fresh seed, thus differing from the method of determining varieties advocated by W. W. Tracy, jr., who used plant, pod, and seed characters (E. S. R., 19, p. 539). Since seed varies somewhat in size and coloring according to the locality, this key is held to be more applicable to northern-grown seed. The varieties of each species (*Phaseolus vulgaris, P. lunatus*, and *P. multiflorus*) are grouped as dwarf and climbing forms, and these are subdivided into green-podded and wax-podded varieties, the individual varieties of the various subclasses being treated in alphabetical order.

The descriptions are accompanied by a series of plates, showing the side and ventral views of ripe seed, cross sections of snap pods, and side views of the snap and green-shell pods. An attempt has been made to simplify and correct the now confused nomenclature. The work is based upon field studies made by the author at Cornell in 1905, at the Connecticut Storrs Station in 1906 and 1907, and cooperative studies with a commercial seed firm at Le Roy, N. Y., and with the Bureau of Plant Industry of this Department, as well as upon an investigation of previous experimental work along this line. The bulletin is

intended to supply the bean breeder with technically accurate information of immediate value and service rather than for general distribution.

Introductory considerations treat briefly of the production of new varieties, synonymy, nomenclature, cultural peculiarities, insect enemies, and diseases of the bean, disease resistance, desirable varieties for various purposes, and system of classification and terms used in descriptions. Lists are also given of desirable varieties for various purposes.

Notes on mushrooms (*Gardening, 17 (1909), No. 400, p. 248, fig. 1*).—In these notes the use of common salt, either sprinkled on the beds or given in solution in water, is advocated and discussed as a means for keeping up the available supply of moisture in the beds without constant watering, thereby maintaining the quality of the crop over a long picking period. Pouring cold water directly on the beds not only makes the soil mechanically unsuitable for the mycelium to spread, but reduces the temperature of the bed too much, thus causing the quality of the product to deteriorate.

Dewberry growing, O. B. WHIPPLE (*Colorado Sta. Bul. 136, pp. 3–8*).—A popular discussion of this subject and especially of the following phases: Soils and locations; propagation; preparation of land for planting; planting; cultivation; irrigation; fertilizing; pruning; winter protection; picking; packing; varieties; insects and diseases; and yields and returns. A brief cultural note on the Loganberry is also given.

Breeding apples for Indiana, J. A. BURTON (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 43, 44*).—The author has been growing seed from selected apples and from crosses since 1900. Notes are given on a few of these apples which came into bearing in 1907.

Bud variation in Corinth currant vine, D. MCALPINE and F. DE CASTELLA (*Jour. Dept. Agr. Victoria, 7 (1909), No. 3, pp. 145–149, figs. 2*).—This consists of a brief account and discussion of a peculiar case of variation in the fruit of the Corinth currant vine, the cause of which is unknown, but which is believed to be a case of bud variation. The variation referred to is that of a bunch of grapes, in which some of the berries resemble Corinth currants, and others Muscat Gordo Blanco grapes, the halves of one berry resembling respectively each of the above-named varieties.

Citrus culture in the arid Southwest, J. E. COIT (*Arizona Sta. Bul. 58, pp. 289–328, figs. 9*).—The climatic conditions of the arid Southwest in their relation to citrus culture are discussed and practical suggestions are given for growing citrus fruits, including methods of propagation and planting, stocks for citrus trees, cultivation, irrigation, pruning, picking, and packing. Consideration is also given to the botany of citrus plants, and to diseases and insect pests and their control.

At the present time less than 1,500 acres in the arid Southwest, including northwestern Sonora, Mexico, are occupied by citrus groves. The Washington navel orange grown in this region is of high color and generally free from smut. It commands high prices. The author warns, however, that "the old idea that citrus culture in Arizona is not endangered by insect pests or plant diseases should be considerably modified, as several such insects and plant diseases are already known." The soils are chiefly in need of a greater humus content.

[Report on horticulture], J. E. COIT (*Arizona Sta. Rpt. 1908, pp. 341–346*).—Detailed statements are given relative to the condition of the date orchards at Tempe and Yuma, and at the station farm, together with notes on the cultural experiments with Smyrna figs and an outline of other horticultural investigations for the year.

Pineapple growing in Porto Rico, H. C. Henricksen and M. J. Iorns (*Porto Rico Sta. Bul. 8, pp. 7–42, pls. 6*).—This is a discussion of pineapple culture with special reference to Porto Rico conditions. The subject-matter is based upon studies of the pine-growing sections of the West Indies and Florida, and of local conditions in Porto Rico, together with original studies of the particular requirements for successful pineapple production. The following phases are discussed: Structure of the pineapple plant, propagation, soil and its preparation, methods of planting, habit of growth, cultivation, fertilizers, varieties, fruiting, subsequent care, marketing and marketing associations, shipping, canning, pineapple growing as a business proposition, and diseases and insects, and their control.

Pineapple growers are cautioned to secure for planting only absolutely guaranteed healthy plants from clean plantations to prevent the introduction of diseases.

Pineapple shipping experiments in 1908, J. E. Higgins (*Hawaii Sta. Press Bul. 22, pp. 6, pl. 1*).—This is a progress report on the cooperative pineapple shipping experiments being conducted by the station and several growers.

The results of comparisons of the shipping qualities of pineapples from different fields confirmed those previously secured (E. S. R., 20, p. 538). The fruit was carefully handled from field to market during the past season, and the loss by bruising reduced to almost insignificant proportions. The value of curing or holding the fruit for a day or two before packing was tested, the results indicating that 24 hours was sufficient time to allow for the drying of the stems and the cooling of the fruit down to air temperature in the shade, although a longer time might be required during the damper weather when the winter crop is being harvested.

Temperature records taken of the air surrounding the fruit in transit show that the temperature on the poop deck constantly fell below that of the "'tween decks." Comparison of the fruits carried in both parts of the ship shows no advantage for one over the other. The author is of the opinion, however, that the "'tween decks," if adequately ventilated, will afford the safest and best part of the ship for pineapples.

New precooling apparatus (*Ice and Refrig., 36 (1909), No. 5, pp. 258, 259, figs. 3*).—A new precooling apparatus for cooling fruit in railway cars or elsewhere is described and illustrated. The machine, which was invented by J. D. Cunningham, is being used in the South for precooling small fruits and vegetables. It is said to reduce the temperature from 85° or 90° F. down to from 40° to 45° in one hour or less, at the same time eliminating the excess moisture and enabling the ice contained in the car to hold down the temperature until the produce arrives at its destination.

Notes on nut culture, C. I. Lewis (*Oregon Sta. Circ. 3, pp. 3*).—This circular is issued to meet the demands for information on nut culture in Oregon until a bulletin on the subject can be prepared, the one previously noted (E. S. R., 18, p. 840) now being out of print. The following phases are briefly discussed: Present condition of the industry, propagation, grafting, site, planting, pruning, cultivation, harvesting, varieties, and the market. Short notes are also given on the culture of almonds and filberts.

Report of the committee on breeding carnations, C. W. Ward (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 258–269, figs. 20*).—This is a report on methods and technique of improving carnations by breeding in which the author gives considerable data derived from his own investigations along that line.

Stocks, Miss E. R. Saunders and H. B. Killby (*Rpts. to Evolution Com. Roy. Soc. [London], 1908, No. 4, pp. 35–40*).—Tabular data are given on recent

breeding experiments conducted with several strains of stocks. These show that the F_1 generation from matings where one parent is throwing doubles, and the other not, is all single; that the F_1 generation from matings where both parents are throwing doubles consists of a mixture of singles and doubles; and that there is an absence of doubles in F_1 when both parents are pure-breeding singles.

Sweet peas, W. BATESON and R. C. PUNNETT (*Rpts. to Evolution Com. Roy. Soc. [London], 1908, No. 4, pp. 6–18, figs. 3*).—An account with the data secured is given of the author's recent experimental studies in the physiology of heredity in sweet peas. The work reported includes studies of a cross between the dwarf procumbent "Cupid" and a half-dwarf form known as the "Bush" sweet pea, the inheritance of the hooded character, gametic coupling, and of the wild Sicilian sweet pea.

The American flower garden, N. BLANCHAN (*New York, 1909, pp. XV+368, pls. 100*).—This popular work treats of the designing and development of formal, old fashioned, naturalistic, wild, rock and water gardens, including suggestions relative to the use of various trees and shrubs, perennials, annuals, bulbs, tuberous plants, ornamental grasses and vines. Chapters are also devoted to the rose garden and to garden furniture. The numerous color plates and half-tone engravings greatly add to the interpretation of the text.

The gardens of England in the midland and eastern counties, edited by C. HOLME (*London, Paris, and New York, 1908, pp. X+XXXVII, pls. 136*).—This special mid-winter number of the *Studio* consists of a series of color and photographic plates by different artists showing a large number of gardens in the midland and eastern counties of England. Introductory articles consist of discussions on the use of gardens, and notes on the illustrations. The corresponding number of the *Studio* for the previous year was devoted in a similar manner to the gardens in the south and west of England.

A practical guide to school, cottage, and allotment gardening, J. WEATHERS (*London and New York, 1908, pp. XIII+248, figs. 66*).—This is a popular work on gardening designed especially for use in schools and for amateur gardeners.

Introductory chapters treat of the general principles of garden making, including the laying out of, and necessary equipment for, small gardens. Succeeding chapters contain detailed instructions for growing fruits, flowers, and vegetables of various kinds. Plant pests and diseases are also discussed. The book concludes with calendars of work to be done during each month of the year, together with examination questions in gardening drawn up especially for the use of school teachers and others who intend to take the examinations of the Royal Horticultural Society.

The florist's bibliography, C. H. PAYNE (*London, 1908, pp. 80, pl. 1*).—This small handbook is presented as an authentic work of references to books and treatises exclusively, or almost exclusively, devoted to florist's flowers and the flower garden. The works are grouped together according to the flowers on which they treat, and under other such headings as annuals and biennials, hardy flowers and perennials, bulbs, etc., Bible flowers, floral art, flowers generally, flower garden, flower lore, and Japanese flowers. The bibliography of the rose is not included, since it has been previously treated separately.

FORESTRY.

Forest trees of Maine and how to know them, E. E. RING (*Waterville, Me.: Me. Forestry Dept., 1908, pp. 62, figs. 65*).—In this pocket manual popular descriptions are given of the forest trees of Maine relative to their bark, leaves,

flowers, fruit, and wood. The important distinctions between different species of the same genus are specially indicated and drawings taken from various sources are given showing foliage, productive organs, winter twigs, buds, etc.

Intolerant and tolerant species. Light tolerance and soil moisture, A. CEISLER (*Licht- und Schattholzarten. Lichtgenuss und Bodenfeuchtigkeit. Vienna, 1909, pp. 21; Centbl. Gesam. Forstw., 35 (1909), No. 1, pp. 4–22*).—The important data of investigations conducted by the author for the past 18 years on the relation of timber species to various degrees of shade are given and discussed.

The deductions made from a study of the results as a whole are in substance as follows: In making the necessary division of timber species into intolerant and tolerant forms according to their specific light requirements, consideration must also be given to the relation between light sufficiency and wood production. Within the limits of the light requirement of any species the growth of tolerant trees is checked less than that of intolerant trees when shadier conditions are brought about. The creation of more favorable moisture conditions in the forest will not result in increased wood production except in the presence of a light intensity which is greater than the minimum light requirement.

In making gap cuttings in tolerant stands, only the over light can be taken into consideration, hence the size of the gap should be regulated according to the light requirement. The best results with nursery trees grown in rows are secured when the beds are not shaded. The paths between the rows, however, should be carefully mulched with moss.

The origin and early development of chestnut sprouts, W. R. MATTOON (*Forestry Quart., 7 (1909), No. 1, pp. 34–47, pls. 4*).—The author reports considerable data obtained from silvical studies of chestnut sprouts made in Connecticut and Pennsylvania. These bring out the leading facts concerning the origin of sprouts and their growth during the first few years, and indicate as well the variations which occur under definite known conditions, such as peculiarities in situation, climate, light, soil, and soundness of parent stock. Comparisons are given of sprout growth from seedling and coppice stumps, and of height growth of chestnut and associated species. The decimation of sprouts by disease and by intolerance of species are also discussed.

Report of the committee on breeding forest and nut trees (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 304–311*).—A report on methods and technique of improving forest and nut trees by breeding. The phases discussed include variability of forest trees, effects of natural and artificial selection, relation of the source of seed to the improvement of the species, relation of the characters of the parent tree to the selection of new forms, health of the parent tree, effect of care and handling of seed of future stock, selection of seedlings for planting and for thinning, and grafting and budding.

Forest measurements, C. A. LYFORD (*Bien. Rpt. Forestry Com. N. H., 1907–8, pp. 121–185, pls. 11*).—This consists of a series of valuation, yield and volume tables and log rules for the more important commercial trees in southern New Hampshire. The tables are based upon data secured from actual mill tallies and studies of sample stands in that section. The practical application of the yield tables is illustrated with sample financial rotation tables for fully stocked unmanaged white pine.

The strength of South Australian timbers, R. W. CHAPMAN (*Trans., Proc. and Rpt. Roy. Soc. So. Aust., 32 (1908), pp. 325–337, figs. 3*).—The data are given on breaking, shearing, tension and compression tests conducted with eleven different species of eucalypts, native to South Australia, together with one pine (*Pinus insignis*). Comparative data on the American oak taken from Johnson's Materials of Construction are also given.

Forest planting in western Kansas, R. S. KELLOGG (*U. S. Dept. Agr., Forest Serv. Circ. 161, pp. 51, figs. 5*).—This circular discusses the kinds of forest trees best adapted to western Kansas and similar neighboring regions, and planting methods which have proved most successful. The suggestions given are based upon a study of established plantations. Consideration is given to the physical features and climate of the territory covered, details of planting, cultivation, pruning, uses of different species, and planting plans, together with notes and measurements on a large number of species which have already been grown in western Kansas.

A study of the forests and reforestation in the Valley of the Ubaye (France), H. VINCENT (*Ann. Sci. Agron., 3. ser., 4 (1909), 1, No. 3, pp. 174–217*).—Notes are given on the native and introduced species of trees growing in the forests of the Ubaye Valley, together with a detailed description of the methods of reforestating land in that region.

Reforestation in the mountains without adjacent nurseries, P. DESCOMBES and H. DEVAUX (*Proc. Verb. Soc. Sci. Phys. et Nat Bordeaux, 1907–8, pp. 41–44*).—An instance is given of the utilization of cold storage for retarding the growth of forest nursery stock grown in a low altitude until the season opened up sufficiently for planting them in the mountains.

Forest finance, C. A. SCHENCK (*Asheville, N. C., 1909, pp. 44*).—This is a guide to lectures on forest finance delivered by the author at the Biltmore Forest School. The following leading topics are discussed: Mathematical principles of finance; increasing or decreasing prices; receipts and expenses in forestry; taxes; protective expenses; capital and money; interest; expectation value; sale value; gauging the merits of an investment; and maturity of trees.

Report of Commission of Inquiry, Tax Lands and Forestry to the governor and legislature of the State (*Rpt. Com. Inq. Tax Lands and Forestry [Mich.], 1908, pp. 146*).—This commission was created by the Michigan legislature of 1907 "to submit to the legislature of 1909 a report setting forth a comprehensive plan for the protection, improvement, utilization, and settlement of the delinquent State tax lands, now owned or that may hereafter be acquired, and for the better and more economical administration of the affairs and business of the State connected therewith, and with other denuded waste or forest land," with a view of developing a consistent and complete policy for administering these lands. This report includes the findings and data secured and the recommendations made by the commission.

The taxation of forest lands and the efficiency of the fire laws in New Hampshire, J. H. FOSTER (*Bien. Rpt. Forestry Com. N. H., 1907–8, pp. 47–120, pls. 16*).—This is a report of investigations conducted by the Forest Service of this Department at the request of the Forestry Commission of New Hampshire, relative to the efficiency of the present system of taxing timber lands and of the fire laws of that State.

Data are given on a number of wood lands examined in different sections of the State. The author discusses the existing tax conditions and points out what the effect would be if the present law were fully enforced. It is concluded that "the actual tax burdens imposed on forest lands of the same value are not equal or 'proportionate' as the State constitution requires, either as between the different towns or different taxpayers in the same town." Suggestions are offered for changing the present system of taxation, and the text is given of a proposed statute worked out by the Forestry Commission and others for the development of a new system of taxation.

The study of the fire laws of the State shows that they are fairly adequate so far as provision for penalties is concerned, but that the work of fire protec-

tion is not carried on in a systematic manner. Recommendations are made for the development of an adequate fire system.

Annual report of the woods and forests department, 1907, A. F. BROUN (*Rpts. Finance, Admin., and Condition Sudan, 1907, pp. 847–864*).—This is a progress report of forest operations in the various provinces of the Sudan, including a statement of revenues and expenses for the year. Some data are given on the experimental rubber plantings and on planting and tapping experiments with the gum (*Acacia verek*). The usual native method of tapping the gum tree was compared with a more careful method of removing small strips of bark only, with tapping by means of small incisions, and with the use of supposed gum-producing bacilli. The native method yielded half as much again as the small-strip method, while the poorest results were secured with the supposedly inoculated trees.

French system of turpentining, A. L. BROWER (*Oil, Paint and Drug Reporter, 75 (1909), No. 18, pp. 28f, 28g, figs. 4*).—This is a report of a study of the French system of turpentining recently made by the Forest Service of this Department for the purpose of comparing the French methods with the best methods in use in this country. A detailed account is given of the French practices. Under the best practices in this country the productive life of a tree is only 4 to 6 years, whereas under the French system trees have been tapped for 30 years. It is not believed, however, that the French method of turpentining, which requires greater skill, is more costly, and less productive than any of the methods used in this country, will be received favorably by the American turpentiner.

DISEASES OF PLANTS.

Plant physiology and pathology, W. R. MCCALLUM (*Arizona Sta. Rpt. 1908, pp. 357–361*).—A report is given of investigations carried on in the department of plant physiology and pathology, the principal results given being of studies on the Fusarium diseases of alfalfa, melons, cucumbers, tomatoes, and other plants. These diseases are among the most destructive plant diseases in the Territory, and they are apparently due to different forms of Fusarium the relationships of which have not yet been worked out.

Brief notes are given on damping off in seed beds, due to species of Fusarium and to a species of Sclerotinia; and on an investigation as to the cause of the dying of eucalyptus trees, which was found to be due to poorly drained soil; and the effect of flooding of the soil on the destruction of nematodes. The experiments showed that in boxes of soil completely submerged for 10 days the nematodes were sufficiently abundant to destroy cantaloups and tomatoes subsequently grown in the boxes.

Physiological studies on potatoes and tomatoes are reported, the potato investigations being a study of some of the factors involving tuber formation. It was found that tubers kept in dry, light places developed sprouts of a peculiar character; they are short, thick, purplish in color, dotted toward the base with root primordia, and showing many suppressed lateral shoots. Some of these elongate into tuber-like structures. If such tubers are planted the central sprout continues to develop and most of the already-formed tubers enlarge, and this gives the potato a considerable advantage over those planted in the usual manner. The author states that during very hot seasons tubers seldom develop, while there is a luxuriant growth of tops. His experiments have shown that if the excessive foliage development is suppressed tubers will be formed and produce a fair crop. The effect of chemical substances in depressing certain stages of growth have been investigated and the results thus far obtained warrant further investigations along that line.

In experiments with tomatoes, sowing seed in flats and transferring the plants to pots and repotting them two or three times was of decided advantage, producing the main crop fully 3 weeks before those sown and set in the usual way.

Plant pathology, T. W. KIRK and A. H. COCKAYNE (*New Zeal. Dept. Agr. Ann. Rpt., 16 (1908), pp. 108–117, pls. 9, figs. 2*).—A review is presented of the plant diseases which have been investigated during the year covered by the report, relatively little injury having been done to crops on account of the dry weather. Notes are given on a few diseases that have not hitherto been extensively reported upon, among them a clematis rust caused by *Ecidium otagense*, an aster wilt due to *Fusarium* sp., and diseases of the apple, among which are powdery mildew (*Podosphæra leucotricha*), apple scab (*Fusicladium dendriticum*), and a disease often confused with apple scab caused by *Coniothecium chomatosporum*. The die back of peaches, due to *Clasterosporium carpophilum*, and peach leaf curl are described, after which an account is given of potato blight, potato Rhizoctonia, etc.

Notes on some fungus diseases of plants, G. LÜSTNER (*Ber. K. Lehranst. Wein, Obst, u. Gartenbau Geisenheim, 1907, pp. 322–330, figs. 4*).—Notes are given on a disease of young apple trees due to *Fusidium* sp., the occurrence of *Gymnosporangium sabinæ* on fruits of the pear, a Glœosporium disease of cherries, a Nectria and Fusidium on the fruits of apple trees, dodder (*Cuscuta lupuliformis*) on pear twigs, and the destruction of grape stakes by the fungus *Xylaria hypoxylon*.

Some notes on nonparasitic diseases in the summer of 1907, P. GRAEBNER (*Jahresber. Ver. Angew. Bot., 5 (1907), pp. 226–233*).—Frost injury as a cause of disease in plants is discussed, and the results of low temperatures in the summer of 1907 on a number of species are shown. The effect of drought and excessive moisture as contributing to disease are also commented upon.

Injuries to plants due to hail and frost, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1909, No. 2, pp. 53–55, pl. 1*).—An account is given of injuries to plants due to hail and frost, and attention called to the fact that where plants have been caught by spring frost they should be protected by a covering of some kind, so that they will gradually thaw out. When covering is impracticable, a thorough spraying with cold water is often effective in preventing rapid thawing. In the case of frost cracks or injury caused by hail, the wounded parts of plants should be sprayed with Bordeaux mixture at intervals until a callus is formed, to prevent the entrance of fungi.

Infection experiments with Erysiphe cichoracearum, G. M. REED (*Bul. Univ. Wis., No. 250, pp. 337–416*).—This is a thesis submitted for the degree of doctor of philosophy, University of Wisconsin, and is in continuation of previous investigations (E. S. R., 20, p. 247) on the specialization of the mildew *E. cichoraccarum*. The author has made further experiments with this mildew on the squash and tested its capacity for infecting a number of cucurbits belonging to other species. The mildew occurring on asters, which is the same morphological species, as well as the mildew on grasses and a great many other plants, were studied by means of infection experiments.

The results of the experiments show that the form occurring on the squash can be readily transmitted to at least 11 other species of cucurbits belonging to 7 different genera. The author was unable to transfer it to asters or goldenrod, or vice versa, and so far as the investigations have gone, the form of mildew occurring on cucurbits is the only one which is capable of infecting plants belonging to more than one genus. In other instances the mildew was found to be limited closely to a single genus. In the case of the rye mildew it is limited to the genus Secale, and the form on the blue grass to species of Poa.

The work is described at considerable length, frequent references to literature being given, and in conclusion a bibliography is appended.

The effect of Ustilago maydis on Zea mays tunicata, CHIFFLOT (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 7, pp. 426–429*).—For a number of years the author has been growing the variety *tunicata* of *Z. mays* in the botanical gardens at Lyon. Two forms were always produced, a tunicate and a naked spike, although seed from the naked form was continuously planted. The planting has been made where corn smut was abundant, as shown by its occurrence on other varieties, but no traumatisms have ever been observed on the roots or young plants of this particular variety.

If the staminate flower panicles which are attacked by the smut fungus be examined, in the so-called cauliflower clusters there will be found pistillate and hermaphrodite flowers. The anthers of the stamens, although apparently normal, do not open, or only slightly, and the pollen grains appear greatly modified. Sometimes the filaments are hypertrophied and the ovules of the hermaphrodite flowers do not mature, but the pistillate flowers always develop and produce seed. None of these modifications are observed in the normal staminate flowers. The change is attributed to unequal osmotic pressure due to the presence of the fungus, producing hypertrophy of the vegetative and reproductive organs.

Black root disease of cotton in Georgia and its control, A. C. LEWIS (*Ga. Bd. Ent. Bul. 28, pp. 24, figs. 9*).—A popular description is given of the black root or wilt disease of cotton, due to the fungus *Ncocosmospora vasinfecta*, and means are suggested for its control.

The author reports 3 years' experiments for the control of this disease, showing that fertilizers, fungicides, and date of planting have little or no effect in reducing it. Variety tests have shown that while different varieties vary greatly in their susceptibility to disease, none except a few resistant strains are sufficiently resistant to warrant their planting on diseased land. Among these are 2 varieties originated by the Bureau of Plant Industry of this Department and 3 strains not yet named which were originated by the author.

Potato scab and its eradication, L. F. HENDERSON (*Maritime Farmer, 14 (1909), No. 13, pp. 291, 292*).—The results of a series of experiments on the prevention of potato scab by means of treating the seed tubers with sulphur, formalin, and corrosive sublimate are given. Different lots of seed were treated, some scabby and others apparently free from disease, and the treated tubers planted in clean and scab-infested soils.

As a result of the experiment, the author found that rolling seed potatoes in sulphur did not prevent scab to any considerable extent. Treated potatoes planted in soil that was scabby from the previous year's crop produced a scabby crop, while treated potatoes planted in scab-free soil gave clean tubers. Formalin gave as good results as corrosive sublimate, and being less dangerous to use, is recommended for general use for scab prevention.

A radish disease, K. VON TUBEUF (*Naturw. Ztschr. Forst. u. Landw., 6 (1908), No. 9, pp. 487–492, figs. 7*).—In 1898 the author described a bacterial disease of radishes and gave suggestions for its control. Later (E. S. R., 12, p. 462) a disease somewhat similar in gross characteristics was described as due to *Peronospora parasitica*. The author has repeated his study of the bacterial disease, comparing it with that caused by the fungus. The bacterium was again isolated and cultivated on nutrient media and inoculation experiments were made showing that the condition originally described by him was due to the bacterium. In nature the bacteria probably gain entrance through insect or other injuries and their spread is facilitated by the fungus. Comparing the effect of the bacterium and the Peronospora, the author states that the spread

of the disease and the extent of the injury are much the greater for the bacterium.

Some results of recent investigations on the diseases of sugar beets, K. STÖRMER (*Bl. Zuckerrübenbau, 15 (1908), Nos. 16, pp. 247–254; 17, pp. 264–269; 18, pp. 279–283*).—In an address before the general meeting of the Associations of German Sugar Industry, a summary account is given of some of the more recent investigations of sugar-beet diseases and means for their control.

The blossom blast or blight of cranberries, C. L. SHEAR (*[Proc.] Wis. Cranberry Growers' Assoc., 22 (1909), pp. 4–7*).—Attention is called to the blossom blast or blight, which the author states is due largely to climatic and growth conditions. So far as Wisconsin conditions are concerned, fungi apparently have an unimportant part in the destruction of flowers resulting in the blight, cold weather and excessive vegetative growth being more commonly the cause of the nonsetting of the fruit.

The failure to set fruit may be avoided by providing a sufficient storage reservoir to prevent injury from frost, by judicious sanding, and by the selection and production of hardy varieties. Where fungus parasites are present, spraying with Bordeaux mixture may be practiced.

Investigations on black rot of grapes, L. SOURSAC (*Ann. École Nat. Agr. Montpellier, n. ser., 8 (1908), No. 2, pp. 151–160, dgm. 1; 8 (1909), No. 3, pp. 161–175*).—The primary object of this investigation was to establish the scale of resistance for different species of grapes toward the black rot. The author found that the different species were unequally resistant, and he classifies them in the increasing order of resistance as follows: *Vitis vinifera*, *V. arizonica*, *V. californica*, *V. labrusca*, *V. rubra*, *V. monticola*, *V. coriacea*, and *V. rupestris*, and *V. cordifolia*, *V. riparia*, and *V. candicans* apparently resistant.

In the formation of hybrids of grapes, the author suggests that attention should be paid to the resistance of the parent plants to disease. Attention is called to the fact that different varieties of the same species also vary in their susceptibility to disease.

The claims that the leaves can be infected at certain stages of growth only and that there are definite periods of infection were investigated. The author found that the receptivity of young leaves, according to others' observations as well as his own, seem to be checked at some distance from the tip of the shoots, but that the position of the leaf varies with the species and also in the same species with different stages of growth.

The author believes that the grape is susceptible not only after the periods of receptivity described by others, but also that during these periods the number of leaves which are subject to infection is quite large.

The difference in resistance to black rot in the different species of the genus Vitis does not seem to be dependent upon the thickness of the cuticle.

The effect of various fungicides on the flowers of grapes, E. MOLZ (*Ber. K. Lehranst. Wein, Obst, u. Gartenbau Geisenheim, 1907, pp. 316–319*).—Experiments were conducted with Bordeaux mixture; soda Bordeaux mixture; neutral copper acetate; Eclair, which is said to be a mixture of copper acetate, sodium acetate, and sodium sulphate; crystal azurin, which is a mixture of copper sulphate and ammonia; and several powder fungicides, among them Nördlinger's preparations, which consist of 10 per cent copper sulphate variously diluted with talcum, powdered lime, a natural silicate of aluminum and magnesia, and kaolin; Nonnit, and powdered sulphur. Two applications of the fungicides were given to grapes at intervals of about a week, and the flowers and leaves were examined 3 days later.

Neither the flowers nor the leaves were at all injured by the Bordeaux mixture, the Nördlinger preparations, or the powdered sulphur. Some slight injury

was done the flowers by the soda Bordeaux mixture. The neutral copper acetate and the other preparations were quite injurious, in some instances two-thirds or more of the flowers being destroyed.

Experiments in combating the downy mildew of the grape, G. LÜSTNER (*Ber. K. Lehranst. Wein, Obst, u. Gartenbau Geisenheim, 1907, pp. 342–345*).—The results are given of a series of experiments with solutions and powders for the control of grape downy mildew. The powders were tested to determine whether they could be profitably substituted for liquid fungicides, and also as to their effect in protecting the flowers and fruit against infection and as to the value of combined spraying and dusting for the prevention of mildew.

Three applications were given all the vines, and the relative efficiency of the fungicides was determined by an examination of the leaves some six weeks after the last application. The best results were obtained with a 1 and 2 per cent solution of what is called Rumm's copper preparation, closely followed by 1 per cent Bordeaux mixture. Following these lots were those dusted with Nördlinger's copper mixtures, copper sulphate diluted with silicate of aluminum and magnesia, with talcum, and with kaolin. For the most part, there appeared to be no advantage in combining Bordeaux mixture with any of the powders.

Is arsenical spraying killing our fruit trees? E. D. BALL (*Gem State Rural, 14 (1909), No. 10, pp. 6–8*).—In an address before the Utah State Horticultural Society the author reviews a bulletin of the Colorado Station (E. S. R., 20, p. 452). He concludes that instead of the injury being due to arsenical sprays, alkaline ground water and collar rot are the principal causes. Trees in widely distributed areas and on which no arsenic has ever been used are said to have been killed, the symptoms being identical with those described in the above bulletin. The author concludes that arsenical poisoning is not the underlying cause of the destruction of the trees. It is also pointed out that in the bulletin it is stated that the trees were sprayed with soluble arsenite, a compound which is seldom used for spraying purposes.

A note on one of the coconut diseases, J. H. HART (*Proc. Agr. Soc. Trinidad and Tobago, 9 (1909), No. 2, pp. 60, 61*).—The author states that the petioles of leaves of a coconut tree showing the perithecia of a fungus were placed in his hands for examination, and a subsequent study showed that the fungus is probably that described under the name Botryodiplodia.

Spores of this fungus when placed on a fresh cacao pod resulted in the production of appearances exactly corresponding with the brown rot of cacao, due to *Diplodia cacaoicola*, the pod rotting in the same manner. Some slight differences were noticed in the size of the spores, but otherwise the fungi on both hosts are believed to be closely allied, if not identical. The fact that a diseased coconut tree is able to infect cacao pods and cause a disease identical with brown rot is of interest in showing methods of infection which have not previously been recorded.

The oak mildew, E. FISCHER (*Schweiz. Ztschr. Forstw., 60 (1909), No. 1, pp. 10–15, figs. 4*).—The author gives an account of the mildew that was so conspicuous in 1908 on different species of oaks, and discusses the probable relationship of the fungus, the oïdium stage of which was the only form observed.

Some wood-destroying fungi, O. BITTMANN (*Österr. Forst u. Jagd Ztg., 27 (1909), No. 10, pp. 84, 85, figs. 30*).—Illustrated notes are given on a number of parasitic and saprophytic fungi which are known to attack deciduous trees.

Some obscure gall diseases, R. LAUBERT (*Deut. Landw. Presse, 36 (1909), No. 19, pp. 211, 212, figs. 4*).—Descriptions are given of some unusual gall formations on oaks, birches, and roses, the causes of which are not definitely known.

Combating plant diseases. E. Voges (*Deut. Landw. Presse, 36 (1909), Nos. 5, pp. 43, 44, figs. 7; 6, pp. 54, 55, figs. 2*).—A discussion is given of some of the pear tree diseases, especially those due to *Hendersonia piricola* and *Phyllosticta pirina*, after which the results of spraying experiments with carbolineum are described. The carbolineum was found to burn the leaves to some extent, and the fungus was found growing in areas adjoining spots on leaves that had been destroyed by the chemical.

The author doubts the value of carbolineum as a universal fungicide, and also calls attention to the necessity of thorough and repeated spraying with Bordeaux mixture and other prophylactic measures for keeping the host plants in vigorous condition.

The use of carbolineum in combating apple and pear scab. K. Huber (*Deut. Obstbau Ztg., 1908, No. 23–24, pp. 385–387, figs. 4*).—The author conducted a series of experiments in which apple trees were sprayed with carbolineum for the prevention of the apple scab (*Fusicladium dendriticum*), comparisons being made with similar lots of trees sprayed with Bordeaux mixture. The carbolineum was used both as a winter and summer spray, but its value as a fungicide was clearly inferior to that of Bordeaux mixture, as was shown by the effects on fruit and foliage.

Carbolineum as a fungicide. R. Schander (*Deut. Landw. Presse, 36 (1909), No. 7, pp. 63, 64, figs. 2*).—On account of the claims put forth regarding carbolineum as an insecticide and fungicide, the author conducted a series of experiments using the chemical as a winter wash and as a summer spray for the control of apple scab, comparisons being made with trees sprayed with a 2 per cent Bordeaux mixture.

Four varieties of trees were sprayed and an equal number of fruits was gathered from each tree and examined for diseased spots. In every instance the least disease was found on the fruits from the trees which had been sprayed with Bordeaux mixture and the greatest number where the spraying had been done with ½ per cent carbolineum. The percentage of spotted apples in the plats receiving carbolineum exceeded in nearly every instance that from unsprayed trees.

Tenax, a fungicide for combating Peronospora (*Weinbau u. Weinhandel., 26 (1908), No. 29, pp. 193, 194*).—An account is given of some experiments showing the value of Tenax, a trade preparation, as a fungicide. This substance is said to consist of copper sulphate, clay treated with sulphuric acid, and soda in about equal proportions. A 1 per cent solution of this mixture is recommended for use against all kinds of downy mildew, and from the experiments described it appears to be more adhesive than either Bordeaux mixture or soda Bordeaux mixture. It is also claimed to be cheaper, more easily prepared, and fully as efficient as either of the above fungicides.

A new product for use in the control of fungus diseases, Bruning (*Ztgrnds., 24 (1909), No. 13, pp. 355–357*).—Attention is called to cupric oxychlorid, a product made by electrolytic methods, which the author states is of superior value as a fungicide. It is claimed that it is cheaper than copper sulphate and can be used in much greater dilutions; consequently a decided saving could be made by its use, if the claims made for it are substantiated.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The Nevada mouse plague of 1907, S. S. E. Pitts (*U. S. Dept. Agr., Farmers' Bul. 352, pp. 24, figs. 11*).—This gives an account of the recent mouse plague in Humboldt Valley, Nevada. The mouse implicated, locally known as the black mouse, proved to be the Carson field mouse (*Microtus montanus*). "By

October, 1907, a large part of the cultivated lands in the lower part of the Humboldt Valley had been overrun by vast numbers of mice. The yield of hay had been reduced by one-third; potatoes and root crops were largely destroyed; many alfalfa fields were ruined by the mice eating the roots of the plants; and the complete destruction of this, the chief crop in the valley, was threatened. The height of the abundance was reached in November, when it was estimated that on many ranches there were from 8,000 to 12,000 mice to each acre."

The preparations in general used by the ranchmen in combating the pest consisted of wheat treated with a strong solution of yellow phosphorus in carbon bisulphid. As the result of its extensive employment in the valley, California quail, an introduced species, were decimated, and magpies, crows, meadow larks, and smaller seed-eating birds suffered extremely. Several attempts by ranchmen to introduce contagious diseases among the mice by means of advertised bacterial preparations failed. "The scourge of mice swept over about four-fifths of the cultivated area in the lower part of Humboldt Valley. Of about 20,000 acres in alfalfa, about 15,000 were so seriously injured as to require plowing and replanting. Over most of this area the alfalfa was replaced by grain crops for the season of 1908, at great expense and loss, since good alfalfa lands pay gross returns of from $60 to $70 per acre, while good grain crops return only $35 or $40 per acre." This is said to be the first recorded instance of an eruption of field mice in North America attaining the proportions of a plague.

Experiments conducted by the Biological Survey demonstrate that the mice can be effectively destroyed in winter by alfalfa hay poisoned with strichnia sulphate, and such poisoning is considered the most practicable. Ordinarily poisoning in winter will prevent the necessity for it in summer. When, however, mice appear in alarming numbers in the spring they should be promptly suppressed, since under these conditions a plague may be well established by fall. Other remedies are considered at some length. Attention is also called to the part played by natural enemies of the mice and the importance of their protection.

Proceedings of the twenty-first annual meeting of the American Association of Economic Entomologists (*Jour. Econ. Ent., 2 (1909), No. 1, pp. 1–66, pl. 1*).—This is the report of the meeting held at Baltimore, Md., December 28 and 29, 1908, a preliminary note on which has been given (E. S. R., 20, p. 496). In addition to addresses, papers, and discussions, the report includes the business proceedings, including reports of the secretary, committees on legislation, nomenclature, insecticides, membership, memorial resolutions, etc., the constitution as aodpted, and a list (pp. 14–16) of 89 common names of insects adopted at the meeting.

President S. A. Forbes, in his annual address, discusses the Aspects of Progress in Economic Entomology (pp. 25–35). Attention is called to the rapid development of economic entomology in the last 15 years, the value of statistical methods in determining the range of variations, the developing methods of ecology, the breeding of insect-resistant plants, etc. A paper on *Pemphigus tessellata*, by Miss Edith M. Patch (pp. 35, 36), calls attention to the fact that the life cycle of comparatively few of the species belonging to the genus Pemphigus is known. It is shown that the Pemphigus common upon the leaves of *Acer dasycarpum* from early spring to mid-July are hatched from the eggs of *P. tessellata* deposited upon the maple trunk, as previously noted (E. S. R., 20, p. 856). The Economic Status of the House Fly is discussed in a paper by E. P. Felt (pp. 39–44).

In a paper entitled Notes on Cranberry Pests, H. J. Franklin presents information gained during the season of 1907 while studying the life histories of cranberry bog insects on Cape Cod (pp. 46–48). *Peronea minuta* is said to be two-brooded in Massachusetts and three-brooded in New Jersey. The winter brood of moths in Massachusetts is slate-gray in color, but the summer brood is orange-red. In New Jersey also the winter brood is slate-gray, but the two summer broods are both orange-red in color. Differences in habits and coloration of the larvæ in the two States are also discussed. The difference in the habits of the fireworm (*Eudemis vacciniana*) on Cape Cod and in Wisconsin is considered as probably due to the variation in the dampness of the bog surfaces. Attention is called to the fact that on the strictly dry bogs of Cape Cod certain undetermined species of ants collect both yellow-headed cranberry worms and fruit worms in large numbers, and the possibility of developing them as a means of combating these pests on dry bogs is mentioned.

Under the title, An Example of Forest Insect Control at a Profit (pp. 49–53), A. D. Hopkins discusses an experiment in which a quite extensive outbreak in Colorado of Dendroctonus beetles was controlled without expense. This was brought about by methods of lumbering based upon a knowledge of the life history of these beetles. Notes on *Empoasca mali* were presented by F. L. Washburn (pp. 54–58), in which the fall-laid egg, oviposition during the summer months, food plants, different stages and number of broods, and economic suggestions are considered. A general discussion of the subject, Do We Need the Insectary? opened by E. D. Sanderson, was entered into by a number of entomologists (pp. 59–64). S. A. Forbes spoke briefly of Methods of Rearing White Grubs (pp. 64, 65).

[Report of the biologist for 1907], H. W. Smith (*Ann. Rpt. Sec. Agr. Nova Scotia, 1907, pt. 1, pp. 20–33*).—The year under report is said to have been very favorable to insect development in Nova Scotia. Inquiries were received from every part of the province concerning injurious insects, particularly the tussock moth, tent caterpillar, fall webworm, and the red-humped apple-tree caterpillar. As many nests of the brown-tail moth were found in 4 counties during the spring of 1907, studies were made of its life history, habits, and distribution in Nova Scotia. A synopsis is also presented of the life histories of a number of other injurious insects.

Note on food habit of Liotropis contaminatus, H. Osborn (*Ent. News, 20 (1909), No. 4, p. 177*).—This pentatomid has been taken upon *Opuntia fulgida* near Tucson, Ariz. The author considers this cactus as probably the native food plant of the species.

Notes on Œcanthus, C. O. Houghton (*Canad. Ent., 41 (1909), No. 4, pp. 113–115*).—The author concludes from observations upon *Œcanthus niveus* that tree crickets feed almost entirely upon animal matter such as plant lice, etc.

The Hessian fly in Georgia, E. L. Worsham and A. C. Lewis (*Ga. Bd. Ent. Circ. 7, pp. 8, figs. 6*).—The Hessian fly is said to be the only insect that seriously injures wheat in Georgia. As a rule the percentage of wheat infested is low, but in seasons favorable to the fly it may be very great. At Adairsville in 1905 the percentage of infestation in one field was 89.8. There are 2 broods of this fly in Georgia.

"Notes made on the life history in the field and laboratory, so far as worked out, are as follows: The spring brood emerges between February 21 and March 23. The dates of emerging each year, as far as observations have been made, are as follows: February 21, 1905; February 26 to March 9, 1906; March 12 to 23, 1908. The fall brood emerges between September 28 and October 30. In 1904 they began emerging on October 18 and continued up to October 30. In 1905 they were found flying in a wheat field at Ringgold, Ga., on October 23.

The egg laying period and the length of the pupal stage have not been determined. By December 20 most of the larvæ are in the 'flaxseed.'"

On the basis of experiments here recorded it is recommended that sowing be done from October 20 to 30.

What can be done in destroying the cotton boll weevil during the winter, W. D. HUNTER (*U. S. Dept. Agr., Bur. Ent. Circ. 107, pp. 4*).—The author calls attention to the fact that while the most important step in the control of the cotton boll weevil is the fall destruction of cotton stalks, there is much effective work that can be done while the pest is in hibernation. The raking and burning of trash in cotton fields, the burning of turn rows, ditches, sorghum and corn fields, etc., and the cleaning of fence corners and similar situations are particularly recommended.

The rose slugs, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Circ. 105, pp. 12, figs. 5*).—Information is presented on the 3 sawflies which attack roses in the United States.

For the so-called rose sawfly (*Endelomyia rosæ*) the author uses the name American rose slug, indicating that it is native to America. This species is supposed to have originated in New England, where it fed upon the wild rose. It is now known to occur as far south as Virginia and west to Missouri and Illinois. Life history notes are presented. The larvæ or slugs feed chiefly at night and always on the upper surface of the leaves, which are skeletonized and not eaten, except when the larvæ are nearly fully grown.

The second species (*Cladius pectinicornis*), which has been given the name bristly rose slug, is thought to have been introduced from Europe prior to 1833. This species is said to be the principal enemy of the rose in and near the District of Columbia and to occur as far west as Missouri. No natural enemies of this pest appear to have been recognized in this country, but 2 parasites *Acrotomus lucidulus* and *Mesochorus cimbicis*, prey upon it in Europe.

The third species (*Emphytus cinctus*), which has been given the name coiled rose slug, is a comparatively recent importation, having first attracted attention near Boston in 1887. It has since been reported from Maine, New York, Pennsylvania, and Canada. *Tachina rustica* has been reared from larvæ collected in Pennsylvania, while in Europe an ichneumon fly (*Cryptus emphytorum*) is parasitic upon it.

The remedies suggested apply to all three species. These are considered under headings of sprinkling with water, Paris green, arsenate of lead, hellebore, soaps and other washes, etc.

Experiments with repellents against the corn root-aphis, 1905 and 1906, S. A. FORBES (*Illinois Sta. Bul. 130, pp. 3–28*).—The corn root-aphis has become one of the most destructive and dangerous insect pests of the corn plant, due to the cornfield ant which protects, transports and guards the aphis and collects and preserves the eggs. The control of these insects is very important, because the injury to corn is sure to increase the more generally and continuously corn is grown. About the only natural agency that can be depended upon to reduce the numbers of the corn root-aphis is a long-continued soaking of the ground by frequent heavy rains.

Experiments with repellents were initiated in 1905 and continued during 1906. These are here reported in detail and summarized as follows:

"Thirty minutes' soaking of seed corn in kerosene before planting, injured seed but protected plants against root-aphis in preliminary field experiment made in 1905.

"Summer plat-plantings made in 1905, with seed treated with kerosene, kerosene emulsion, coal-tar water, or turpentine, showed no injury after a moderate

use of kerosene and coal-tar water. Results with kerosene emulsion and with turpentine were conflicting.

"Indoor pot-plantings in 1906 showed no injury after a moderate use of kerosene, oil of lemon, carbolic acid, formalin, lysol, chlorid of lime, carbon bisulphid, tobacco water, or camphor. Soaking in common alcohol for 30 minutes or in wood alcohol for 20 minutes, injured the seed.

"Extensive field experiments were made in 1906 with minimum quantities of oil of lemon, kerosene, formalin, and carbolic acid applied to seed just before planting. Examination 6 weeks after planting showed average diminution of number of root-lice and of hills infested by them, as follows: Oil of lemon, 76 per cent; kerosene, 57 per cent; formalin, 49 per cent; carbolic acid, 8 per cent. Ten weeks after planting, corn in the experimental plats averaged 72 per cent taller than in checks. Examined 19 weeks after planting, applications made to the seed were found to have increased the number of ear-bearing stalks to the acre as follows: Oil of lemon, 1,159; carbolic acid, 945; formalin, 742; kerosene, 274.

"The increase in root-lice in the field was seven-fold in 23 days—equal to nearly 3 millions to 1 between April 1 and October 1.

"In a small special test, made by planting a few hills of corn close around nests of ants in the field, kerosene and carbolic acid kept the insects away from the corn, but oil of lemon, formalin, and several other substances tested were without effect."

The precautionary measures recommended include a short rotation period in corn, especially during relatively dry years; a deep, thorough, and repeated stirring of old corn ground in fall or spring as a preparation for corn planting; the maintenance and increase of the fertility of the soil; and the use of repellents.

Habits and behavior of the cornfield ant, Lasius niger americanus. S. A. Forbes (*Illinois Sta. Bul. 131, pp. 31–45, fig. 1*).—The author presents a detailed account of the life history and habits of the so-called cornfield ant.

While of great economic importance, due to its protection of the corn root-aphis, this ant is by no means limited to cornfields, being abundant in all cultivated land, in pastures and meadows, in dense forests, and various other places. It is distributed over the whole of North America except the extreme southern and southwestern portion, and is said by W. M. Wheeler to be the most abundant of our ants. In the burrows of this ant are found various species of root lice which it harbors, while in clover fields it is said to harbor mealy bugs (*Pseudococcus trifolii*), which infest the roots of the clover plant.

"Females and males hatching from pupæ as winged ants in the underground nests from June to October, swarm out of their burrows as if by common consent in August or September. . . .

"The males perish before winter, and the scattered females go into the ground, each making for herself an oval or spherical cavity, the beginning of a new family home. Some of these buried females begin to lay eggs in summer and fall—August 15 to November 10, as we have seen them—but others live there alone until spring, depositing their first eggs, according to our observations, from the first to the middle of May, and continuing to lay additional eggs, a few at a time, until September. The minute, maggotlike, footless, and helpless larvæ begin to hatch from these eggs in June, and this hatching process may continue until October. . . . We have found the oldest larvæ full grown and beginning to pupate from the 12th to the 16th of June, and pupation continues, of course, throughout the season, as larvæ from the later eggs successively get their growth. The first workers to emerge from the pupæ in these small colonies

come out early in July—from the 7th to the 11th of that month, according to our experience—and the last emerge in October, or possibly in November.

"From solitary queens brought in from the field April 26 to May 3, 1906, and kept in the insectary under natural conditions, the first eggs were obtained May 8, 9, 10, and 15, and the first larvæ from these eggs June 4. The length of the egg stage in the various lots deposited by these females varied from 22 to 28 days. The larvæ began to pupate about the middle of June, the larval period being, in four cases, 16, 17, 19, and 23 days. The first adult appeared in this cage July 7, and others emerged at intervals throughout the remainder of the year, the pupal stage averaging about 18 days. Judging by these data, the time from the deposit of the egg to the appearance of the adult is approximately 2 months. . . .

"The process of growth and multiplication are interrupted by winter, during which the ants hibernate in a dormant state in whatever stage they happen to have reached, resuming their activities in spring at the point where cold weather arrested them. The workers open up the nests to the surface, usually in late March or in April, the evidence of this beginning of their seasonal activities being the appearance of circular heaps of minute pellets of earth around the mouths of their burrows."

A table is presented which shows the number of ants in all stages contained in 20 nests dug out in an oat field on August 28, 1906. In fully developed nests the number of ants in the various stages varied from 655 to 1,434, with an average for the 17 largest nests of 979. Notes are presented on intercolonial hostilities and the area occupied by a single colony. One of the small red house-ants (*Solenopsis molesta*) and another species (*Formica schaufussi*), common in cornfields, were found inhabiting the nests of the cornfield ant. It is stated that under certain conditions this ant may do considerable injury to corn by direct unaided attack. Crop rotation is considered to be one of the most effective means for checking the multiplication of these destructive insects.

The wheat strawworm (Isosoma grande), F. M. Webster and G. I. Reeves (*U. S. Dept. Agr., Bur. Ent. Circ. 106, pp. 15, figs. 13*).—This pest is said to sustain about the same relation to winter wheat culture west of the Mississippi River that the jointworm does to its cultivation east of this river. Both, when excessively abundant, occasion losses from slight to total. In the Ohio Valley and south of Pennsylvania the ranges of these 2 insects overlap. Both species are often to be found in the same field, the wheat strawworm, however, being less abundant and doing usually but slight injury, while the jointworm occasionally becomes a serious pest.

There are two generations of the insect annually, the adults of the first generation differing considerably in appearance from those of the second. Individuals of the first generation emerge in April from the outstanding straws and stubble, are very small, most of them are females, and many are wingless. The females deposit their eggs in the young wheat plants, the stems of which at this time extend but little above the surface of the ground. The egg is placed in or just below the embryonic wheat head and the larva or worm works within the stem, usually causing a slight enlargement. These worms develop very rapidly, and as they feed upon the most nutritious part of the plant they become more robust and larger than those found in the straw in the late summer. In May the larvæ become full grown and pass at once through a short pupal stage.

In a few days the fully developed insects gnaw circular holes through the walls of the stem and make their way out.

The adults of the second generation deposit their eggs from early May in Texas up to the middle of June in northern Indiana, or about the time wheat

is heading. The larvæ in the walls of the straw do not as a rule kill the stem, but their effect is to shrink kernels, curtailing the yield by reducing the weight.

Eupelmus (*Isosoma*) *allynii* is said to be the most efficient enemy of the pest. *Semiotellus isosomatis* is very efficient in destroying the larvæ in the straw, while *Homoporus* (*Semiotellus*) *chalcidiphagus* and probably other chalcidids are also instrumental in holding the pest in check. These parasites are all the more efficient, as they are double-brooded, developing in late summer and at once ovipositing in other larvæ. The larvæ of a small carabid beetle (*Leptotrachelus dorsalis*) crawls up the stalks, descends into the stubble, and devours the Isosoma larvæ and parasite as well. The mite *Pediculoides* (*Heteropus*) *ventricosus* is also an enemy, gaining access to the larvæ precisely as do the beetle larvæ previously mentioned.

A rotation of crops that will eliminate the growing of wheat 2 years in succession on the same land is very effective, due to the fact that a large proportion of the females are wingless. Where rotation can not be practiced, stubble and outstanding straw should be burned during the fall or winter. The junior author, who has investigated the pest in the State of Washington, presents an account of the relations of the wheat strawworm to wheat production in the Northwest. The strawworm is said to be found wherever wheat is grown in the Columbia Basin, but is not equally destructive over all that territory.

Scale insects of the orchards of Missouri. E. P. Taylor (*Missouri Fruit Sta. Bul. 18, pp. 7–87, pls. 4, figs. 22*).—This bulletin contains a description of the appearance, life history, habits, food plants, and methods of control of the San José scale, cherry scale, Putnam scale, grape scale, walnut scale, oyster-shell scale, scurfy scale, rose scale, terrapin scale, and cottony maple scale.

In the fall of 1907 and spring of 1908, spraying demonstrations were given in eleven separate sections and eight different counties of the State where the San José scale was abundant. Spraying experiments conducted at several localities in St. Louis County for the purpose of comparing the most common forms of sprays, namely, lime-sulphur and miscible oil sprays, are reported. "The average percentage of dead scales upon all experimental orchards sprayed with the standard and commercial lime and sulphur sprays was 89.7 per cent as compared with 99.6 per cent scales dead upon all orchards where commercial miscible oil sprays were used."

The author concludes that when very thorough spraying is done miscible oils (scalecide and target brand) should not be used stronger than 1 part to 20 of water. The comparison of the cost shows the standard lime-sulphur sprays to be somewhat cheaper than the commercial miscible oils, but ease and rapidity with which the commercial miscible oils can be prepared is a point in favor of their use. "It is concluded, however, that when cost and safety to the trees are considered that the lime and sulphur preparations are still for most orchardists the most practical sprays."

Report on experiments for control of San José scale, 1907-8. E. L. Worsham and W. W. Chase (*Ga. Bd. Ent. Circ. 8, pp. 8*).—This is a preliminary report in which the results of experiments conducted in the fall of 1907 and spring of 1908 with soluble oils and a prepared mixture of lime-sulphur are briefly outlined. Applications of target brand scale destroyer, kil-o-scale, soluble petroleum, scalecide, and Schnarr's compounds were made in the fall and the early spring.

The fall applications were in every case more effective than those made in the spring. The results obtained from a single spraying of the prepared lime-sulphur solution seemed to be very satisfactory. They are said to have been just as good as these obtained from any of the soluble oils and the trees seemed to be much the cleaner and healthier in appearance.

The San José scale and lime-sulphur wash, W. E. Hinds (*Alabama College Sta. Bul. 144, pp. 3–22, pl. 1, figs. 3, map 1*).—This is an account of the life history of the San José scale, the injury which it produces, and remedial measures. A map is presented which shows the pest to be well distributed over the State.

The calyx cup must be filled, A. L. Melander (*Jour. Econ. Ent., 2 (1909), No. 1, pp. 67–78; abs. in Country Gent., 74 (1909) No. 2932, p. 348*).—The author here presents a symposium of the objections (contributed by entomologists and horticulturists) to the western method of combating the codling moth.

"The western method aims simply to place poison beneath the stamens. This can best be done by throwing a driving spray through Bordeaux nozzles, at a pressure approximating 200 lbs. Most of the spraying is done from a raised platform, and a crook is used at the end of the rod to direct the spray downward. The spray must be thrown squarely into every blossom for success. A dilute spray of 1 lb. of arsenate of lead to 50 gal. of water copiously applied is more conducive to thoroughness than is a sparing use of a concentrated wash. One such application destroys the first brood and thus actually insures practically 100 per cent of clean fruit. Thus there is no need for later applications. In addition to assuring thoroughness, high pressure means rapid work, thus reducing the labor cost. The weak formula saves quite an item. The absence of late generations of worms eliminates disfiguring 'stings,' which always result when late larvæ have to be destroyed by late surface applications. The single application leaves time for other orchard work after midsummer. Irrigation is not interfered with, as the orchard does not have to be dried out to permit the passage of the spray outfit. There is no damage to apple-laden branches, low hanging because of their weight of fruit, from driving a spray wagon through the closely planted orchards. Moreover, for oily skinned and glaucous varieties it is the only method that can be successfully used. A single thorough spraying has afforded practically 100 per cent returns over hundreds and hundreds of acres of Washington orchards."

Economic loss to the people of the United States through insects that carry disease, L. O. Howard (*U. S. Dept. Agr., Bur. Ent. Bul. 78, pp. 40*).—The author calls attention to the many infectious diseases transmitted through the agency of insects, and discusses in particular the economic loss through mosquitoes and house flies.

It is stated that the development of the State of New Jersey has been held back by the mosquito plague, as has the growth of dairying in southern New Jersey and of paying industries near the mosquito-breeding areas in the vicinity of New York City and other localities. The cost of screening habitations alone for mosquitoes and the house fly exceeds $10,000,000 annually.

Malaria is said to be spreading in this country. It is estimated that the annual death rate in the United States from this disease is nearly 12,000, but attention is called to the fact that the death rate of malaria perhaps, as with no other disease, fails to indicate the real loss from the economic point of view. It is pointed out that vast areas of rich land of the Delta region along the Mississippi River can not be cultivated because of this disease. Large sums have been and are annually being spent in the control of the mosquitoes which transmit malaria and yellow fever. The great loss due to malaria and yellow fever, and the importance of the control of the Anopheles and Stegomyia mosquitoes in the United States, Panama, and other countries are discussed at length.

The author proposes the name "typhoid fly" as a substitute for that of "house fly" now in general use. The habits of this pest are described, and evidence is brought forward to show that it plays a very important part in the distribution of the causative agents of typhoid fever, cholera, tropical dysen-

tery, and other endemic diseases, and that it also possesses importance as a disseminator of the bacilli of tuberculosis. Studies that have been made of the breeding habits of this fly are reviewed at some length, as is the spread of malaria in Greece and its relation to the rise and fall of national power.

The typhoid fly or house fly, L. O. HOWARD (*Sci. Amer. Sup., 67 (1909), No. 1739, pp. 274, 275*).—This is an extract from the bulletin noted above.

House fleas, L. O. HOWARD (*U. S. Dept. Agr., Bur. Ent. Circ. 108, pp. 4, figs. 2*).—This is a brief account of house fleas, accompanied by directions for dealing with them. The dog and cat flea (*Ctenocephalus canis*) is said to have been more frequently reported as infesting houses in this country than the human flea *Pulex irritans*.

Sixth annual report of the State entomologist of Montana, R. A. COOLEY (*Montana Sta. Bul. 75, pp. 89–112, pls. 2, fig. 1*).—The author here presents a preliminary report of investigations concerning the life history and habits of the tick (*Dermacentor venustus*) that is the active agent in the transmission of Rocky Mountain spotted fever of man in Montana and neighborhood States, together with brief notes on Glover's silk moth.

An engorged female tick collected in late July which commenced oviposition on August 4 had deposited 4,814 eggs by September 9, a total of 4,820 eggs being laid. These eggs began to hatch on September 30, thus apparently having required 57 days for incubation at the laboratory temperature. Seed ticks which hatched in early July were kept in a stender dish. These commenced to die in the early part of August, all being dead on August 14, a longevity period of nearly 6 weeks.

The author concludes that larvæ do not attach to a host until about a week has past after hatching. Larvæ engorged upon guinea pigs commenced to drop on the third day following engorgement, the last leaving the host on the seventh day. This variation in the period required for engorgement may be explained by the fact that some seed ticks do not attach until long after others have done so. The author's observations indicate that the greater number of larvæ drop during the day.

Records of the molting of larvæ show 13 days to have been the minimum period with about 2 weeks as the average. The period required for engorgement in the nymphal stage was from 4 to 8 days. Engorged nymphs that dropped on August 12, molted after periods of 41 to 47 days.

In order to investigate the host relations of this tick a trip was made into West Gallatin Canyon. During the trip numerous small mammals of 5 different species were shot. All of 6 Rocky Mountain pikas (*Lagomys princeps*) and 2 of 12 chipmunks (*Tamias quadrivittatus amconus*) collected had ticks in the larval or nymphal stages attached in or very close to the ears.

"It was noticeable that though we shot more red squirrels than other animals, we found no ticks upon them, and though chipmunks were very abundant in the immediate vicinity of the series of rock slides where we secured the pikas, those obtained at this place were in every instance free from ticks, though the pikas had them in every case." Projects for future work are appended to this account.

Brief notes are given on Glover's silk moth (*Samia gloveri*) a species frequently received at the station. While not a pest of much importance, it has been reported as feeding on the currant and gooseberry. Larvæ bred at the laboratory refused to feed on these plants, but willow and maple were eaten freely. Eggs laid on July 5 hatched July 23. Technical descriptions are presented of the six larval instars.

FOODS—HUMAN NUTRITION.

Human foods, H. SNYDER (*New York, 1908, pp. XVI+362, figs. 76*).—The author had in mind in the preparation of this volume a text-book for university students, and has summarized the more important data regarding human nutrition, drawing largely on the results of his own extensive investigations on the subject.

Prominence is given to foods most extensively used in the diet, such as flour, bread, cereals, vegetables, meats, milk, dairy products, and fruits, and to some of the physical, chemical, and bacteriological changes taking place in foods during their preparation for the table which affect digestibility and nutritive value. Dietary studies of the comparative cost and value of foods and the question of rational feeding of man are also considered, while experimental work and laboratory practice are special features of the work. Some of the topics which are closely related to nutrition are also taken up, such as the effect upon food of storage and household sanitation. Review questions, a list of references, and a full index add to the usefulness of the volume.

Packing-house chemistry, A. E. SCHMIDT (*Butchers' Advocate, 46 (1908), Nos. 1, p. 15; 2, pp. 19, 22*).—In this discussion of chemistry in relation to the packing-house industry the author considers such topics as analyses of blood and tankage, cause of sour meats, and the importance of analyzing supplies, and reports some analyses showing the percentage of salt, sugar, and saltpeter of pickling solution which is absorbed by meat, and the amount which is left in the solution. The salt left in the solution after pickling ranged from 49.23 to 76.55 per cent; the sugar from 0 to 18.73 per cent; and the saltpeter from 31.84 to 52.03 per cent of the amount originally present. The author believes that some of the saltpeter removed from the solution is destroyed by bacteria and that the same may be true for a part of the sugar.

Treatise on the adulteration of foods, agricultural products, and drugs, L. COURCELLE and H. RICARD (*Traité des Fraudes Alimentaires Agricoles et Médicamenteuses. Paris, 1909, pp. 693*).—This exhaustive treatise on the adulteration of foods, agricultural products, and drugs discusses the subject with reference to legislative enactments in France and also contains a summary of legislative enactments of other countries. The principal food and other products, methods of manufacture, adulteration, and similar topics are considered.

Biochemistry, F. RÖHMANN (*Biochemie. Berlin, 1908, pp. XVI+768, pl. 1, figs. 43; rev. Chem. Ztg., 33 (1909), no. 29, p. 268*).—In this text-book designed for students of medicine, zoology, and botany the author takes up the principal divisions of organic chemistry with special reference to the needs of such students.

Practical physiological chemistry, P. B. HAWK (*Philadelphia, 1909, 2. ed., pp. XVI+447, pls. 6, figs. 126*).—The author states that this edition has been thoroughly revised in all departments and in part rewritten from the first edition (E. S. R., 19, p. 358). Many new qualitative tests and quantitative methods have been added as well as a chapter on enzyms and their action. The book is designed for use in courses in practical physiological chemistry in schools of medicine and of science.

Report of the royal commission on the meat industry (*Jour. Dept. Agr. West. Aust., 18 (1909), No. 1, pp. 5–14*).—Cattle markets, abattoirs, transportation facilities, market methods, and historical and other data regarding the extent of the West Australia meat industry are summarized.

Bakery inspection and proceedings of Bakers' Institute, October 26 28, 1908 (*Bien. Rpt. Bur. Labor and Indus. Stat. [Wis.], 13 (1906–7), pt. 5, pp.*

(83 840 figs. 49).—The amended Wisconsin laws regarding the regulation of bakeries are quoted, and lists of licensed bakeries and a general account of the work under the State law are given. During the year 30 persons were prosecuted for violations of the law and in every case a verdict of guilty was secured. In general, the results indicate considerable improvement in the baking industry under the law.

The report also contains the proceedings of the Bakers' Institute held in Milwaukee by the University Extension Division of the University of Wisconsin October 26–28, 1908 (E. S. R., 20, p. 395), and the papers with discussions presented at the meeting. Among others may be mentioned: The Inner Structure of the Grain as Related to Flour and Bread, by N. A. Cobb; Flour—Its Composition and Adulteration, by A. L. Winton; Fermentation in Bread Making, by W. D. Frost, in which yeasts, malt extracts, etc., are considered; Food Value of Bread, by J. Erlanger; Examination of Flour with Practical Tests, by Hannah L. Wessling; Bake Shop Hygiene and Sanitation, by M. P. Ravenel; and Bake Shop Hygiene and Sanitation, by C. B. Ball.

Determination of gluten in wheat flour. A. Berman (*Pharm. Weekbl., 46 (1909), No. 10, pp. 227, 228*).—Results of gluten determinations in several sorts of flour are reported.

The changes in flour and cereals due to the action of sulphur dioxid. M. and G. Carteret (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 6, pp. 270–272*).—From their investigations on the subject the authors conclude that treating flour with sulphur dioxid is harmful since it renders kneading of the dough difficult, hinders fermentation, and produces an inferior loaf.

Honey and honey substitutes. A. Hasterlik (*Der Bienenhonig und seine Ersatzmittel. Vienna and Leipsic, 1909, pp. VIII+232, figs. 63; rev. in Ztschr. Öffentl. Chem., 15 (1909), No. 1, p. 20*).—This volume discusses the origin and collection of honey, its examination and valuation, honey substitutes, and similar topics.

Preserved fruits in Europe. R. P. Skinner and H. L. Washington (*Mo. Cons. and Trade Rpts. [U. S.], 1909, No. 343, pp. 111–121*).—Information regarding the French candied fruit, or glacé fruit industry, including accounts of processes of manufacture, etc., is summarized.

Bacteriological studies of the softening of pickled cucumbers. A. Kossowicz (*Ztschr. Landw. Versuchsw. Österr., 11 (1908), No. 12, pp. 894–900*).—Experimental studies were made of the effects of different sorts of bacteria on dill pickles, the conclusion being reached that the potato bacterium (*B. mesentericus vulgatus*) is certainly concerned in the softening. Studies of the total and nonvolatile acid were also made but no definite conclusions are drawn from the recorded variations.

Pickled tea. W. H. Michael (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3444, pp. 15, 16*).—The author describes a fermented or pickled preparation of tea leaves which is eaten in Burma and the Shan States. Commonly the leaves are soaked in oil and seasoned with garlic, dried fish, etc. In some regions a beverage is prepared from this tea.

"Cognac" obtained from cactus figs [prickly pears]. A Sanna (*Staz. Sper. Agr. Ital., 41 (1908), No. 9–11, pp. 550–561; abs. in Chem. Zentbl., 1909, I, No. 8, p. 675; Jour. Soc. Chem. Indus., 28 (1909), No. 5, p. 255*).—Analyses of the cactus fig are given and a method for preparing a spirit which corresponds to a genuine cognac is described.

Russian kvass. F. Graftiau (*Ann. Gembloux, 19 (1909), No. 4, pp. 235–246*).—Directions are given for making different sorts of kvass, a fermented beverage much used in Russia. Kvass fermentation, yield, and cost of different sorts, and other questions are considered.

Acetaldehyde in wine, its origin and effects, A. TRILLAT (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 8, pp. 654–690*).—Acetaldehyde exists in varying quantity in wine and brandy, the author concludes, owing to the oxidation of alcohol by the oxygen of the air. Aeration, the presence of certain microorganisms, and aging are factors affecting its quantity. Acetaldehyde and acetal contribute to the bouquet of wine. Other related topics are considered.

Lecithin in wine and its physiological importance, G. PATUREL (*Monatsber. Gesell. Förd. Wiss. Ackerb. u. Künste Unter-Elsass, 42 (1908), No. 2, pp. 46–49*).—The author reports on an average about 0.1 gm. lecithin per liter and believes this constituent is important in determining the bouquet and also from the standpoint of nutrition. The work of other investigators is cited.

French white wines, J. MAYER (*Ztschr. Öffentl. Chem., 15 (1909), No. 1, pp. 15–18*).—Analytical data are reported and discussed.

Poisoning due to bacterial contamination of food, THOMANN (*Schweiz. Wchnschr. Chem. u. Pharm., 46 (1908), No. 31, pp. 491–494*).—A digest of data.

Dust and disease, E. OWEN (*Brit. Med. Jour., 1908, No. 2484, pp. 321–325*).—A popular summary and discussion.

Eleventh annual convention of the Association of State and National Food and Dairy Departments ([*Proc.*] *Conv. Assoc. State and Nat. Food and Dairy Depts., 11 (1907), pp. 416*).—This volume contains the minutes of the convention of the Association of State and National Food and Dairy Departments held at Jamestown, Va., July, 1907, the report of the executive committee, and similar reports, as well as the papers which were presented. Of these may be mentioned among others: Publicity in the Enforcement of Pure Food Laws, by E. K. Slater; Review of Port Inspection Work, by R. E. Doolittle; The Element of Uniformity in National and State Food Laws, by J. Q. Emery; The Effect on Butter from Feeding Cotton-seed or Cotton-seed Meal, and Difficulties Met with in Detecting its Adulteration, by W. M. Allen; Diabetic Foods, by A. L. Winton; Antiseptics in Tomato Catsup, by F. W. Robison; Bleaching of Flour, by E. F. Ladd; Review of Pure Food Control in the West, by E. W. Burke; The Sanitary Side of the Production, Manufacture, and Distribution of Food Products, by T. J. Bryan; The Preparation of Fruits and Vegetables with and without Preservatives, by S. Mueller; and The Preparation of Tomato Catsup with and without Preservatives, by C. F. Loudon.

Foods (*Bul. Ga. Dept. Agr., 1908, No. 45, pp. 3–72*).—This contains a general summary and report of the chemist.

Work under the State pure food and drugs act, T. G. Hudson (pp. 1–25).—The text is given of the State pure food and drugs act and the work carried on under this act is summarized.

Report of the State chemist, R. E. Stallings (pp. 26–72).—Under the provisions of the State pure food and drugs act, samples of milk, sausage, oysters, butter, oleomargarine, vinegar, molasses and maple sirups, catsups, extracts, olive oils, carbonated beverages, etc., were examined, the total number of samples being 632, of which 45 per cent were found to be adulterated, misbranded, or below standard.

[Dairy and food commissioner report], R. W. DUNLAP (*Ann. Rpt. Ohio Dairy and Food Comr., 23 (1908), pp. 84*).—This report contains a summary and financial statement of the dairy inspection, pure food work, and drug and paint inspection carried on during the year. The total number of articles analyzed by the chemist was 1,897. During the year prosecutions were brought on 91 adulterated articles, the greatest number of any single article, 35, being with milk. A paper on glucose, its preparation, uses, and effects on the system, by W. McPherson, is also included in the report.

Dairy and food division report (*Dept. Agr. and Immigr. Va., Dairy and Food Div. Bul. 4, pp. 39*).—The standards of the State Board of Agriculture and Immigration of Virginia are given. These are in accordance with the provisions of the National pure food laws and became effective January 15, 1909.

Food control work of Chemnitz for 1908, A. Behre (*Pharm. Zentralhalle, 50 (1909), Nos. 8, pp. 149–158; 9, pp. 171–179*).—Meat and fish products, dairy products, flour, bread, yeast, sugar, honey, spice, and other foods and condiments, alcohol and alcohol-free beverages, cooking utensils, proprietary articles, and similar goods were examined.

Food control in Prussia (*Ztschr. Öffentl. Chem., 14 (1908), No. 14, pp. 265–279*).—The article is an extract from part 6 of *Das Gesundheitswesen des Preussischen Staates im Jahre 1906* (Berlin, 1908).

Progress in the examination of foods, condiments, fats, and oils in 1907, Utz (*Österr. Chem. Ztg., 11 (1908), Nos. 10, pp. 135–138; 15, pp. 204–208*).—An annual digest of investigations.

The Jamaica cookery book, Caroline Sullivan (*Kingston and London, 1908, 3. ed., pp. XII+90*).—The author has collected a large number of characteristic recipes used in Jamaica, many of them being for the preparation of tropical fruits and vegetables.

Student diet, X. Arnozan (*Rev. Pédagog., n. ser., 53 (1908), No. 10, pp. 301–325*).—The general principles of student diet are discussed as well as the regulations governing diet in French "lycées" and colleges. Some details are given regarding the character of the meals served.

Alleged undernutrition in rural regions in Germany, Becker (*Sächs. Landw. Ztschr., 56 (1908), No. 49, pp. 1236–1246*).—It has been stated that the diet of the population in rural regions in Germany is low, particularly in protein, and that this condition is attended by serious results. A special investigation of this question in Saxony was undertaken at the request of the Central Association for the Welfare of the People, and the German Association for the Welfare and Advancement of the Home by a special commission.

The conclusion was reached by the commission that in this province a general condition of undernutrition of the rural population does not exist. The report summarizes a considerable amount of data on food conditions in Saxony and similar topics.

The diet of the Russian peasantry, Madam A. L. Pogosky (*Veg. Messenger and Health Rev., 7. ser., 6 (1909), Nos. 2, pp. 37, 38; 3, pp. 64, 65*).—A general descriptive article on foods and food habits.

[Food habits, agriculture, hygiene, and other conditions in equatorial Africa], F. de Filippi (*Ruwenzori. An Account of the Expedition of H. R. H. The Duke of the Abruzzi. London, 1909, pp. XVI+408, pls. 32, figs. 153, maps 5*).—In this account of the exploration of the Mountains of the Moon much information is given regarding agricultural conditions, food habits and customs of native tribes, hygiene, and other conditions in equatorial Africa. The volume also contains a summary of the geodetic, meteorological, and other observations made on the expedition and the mineralogical, zoological, and botanical specimens collected. Of the 337 species of plants collected 16 were new genera, 71 new species, and 6 new varieties.

The feeding of the soldier in barracks, in hospital, and in war, R. J. Blackham (*Brit. Med. Jour., 1908, No. 2484, pp. 310–317*).—A summary of data regarding the rations of European and Japanese armies, with a discussion of food requirements, waste in army dietetics, use of canned goods, and related topics.

In his suggestions for improving army dietetics the author lays emphasis on the need of variety in the ration in the field, which he believes may be obtained

by the addition of cheese and oatmeal, and perhaps sugar in some form. Fresh bread should be baked wherever possible in place of the regulation army biscuits. The hospital ration he considers too large, and he raises the question of protein requirement and the possibility of lowering dietary standards for the army.

The feeding of the soldier (*Brit. Med. Jour., 1908, No. 2484, p. 347*).—An editorial discussion of the above paper.

How much proteid does the body require? A. HAIG (*London, 1909, pp. 8; Med. Press and Circ., 138 (1909), No. 3636, pp. 32, 33*).—On the basis of his clinical experience the author concludes "that few people can remain below 9 grains of albumin per pound [about 90 gm. per 150 lbs. body weight] without loss in both these directions. Their capillary circulation slows because their heart loses power, and their blood quality falls because there is deficient production of its normal elements. . . .

"This 9 grains per pound is to be calculated on a quite normal individual not carrying an excess of adipose tissue, as it is his normal muscle structure we have to nourish, and not the adipose he may have put on top of it when he becomes very sedentary in later life."

Further experiments on the utilization of protein cleavage products in the animal body, E. ABDERHALDEN, E. MESSNER, and H. WINDRATH (*Ztschr. Physiol. Chem., 59 (1909), No. 1, pp. 35–42*).—Additional experiments (E. S. R., 20, p. 1166) are reported in which a nitrogen balance was maintained, or nitrogen gains made, on a ration of both meat and casein cleavage products, fed with considerable amounts of carbohydrates and fat.

Discussion upon the physiology of purin metabolism, J. B. LEATHES ET AL. (*Brit. Med. Jour., 1908, No. 2486, pp. 495–499*).—At the meeting of the British Medical Association at Sheffield, July, 1908, the question of purin metabolism was presented for discussion by J. B. Leathes, who summarized the results of his experimental work on this subject. The question was also considered by C. Watson, E. I. Spriggs, Sir Lauder Brinton, T. H. Milroy, and I. W. Hall.

In summing up the matter it was pointed out by Leathes that for persons in health very considerable physiological variations were to be noticed in the purin metabolism and that these did not depend on imperfect or delayed excretion, but that, generally speaking, the largest amount of uric acid was excreted when the standard of health and activity was highest.

The uric acid excretion of normal men, P. J. HANZLIK and P. B. HAWK (*Proc. Soc. Expt. Biol. and Med., 6 (1908), No. 1, pp. 18, 19*).—The conclusions reached in this investigation follow:

"The average daily excretion of uric acid for 10 men ranging in age from 19 to 29 years, and fed a normal mixed diet, was 0.597 gm., a value somewhat lower than the generally accepted average of 0.7 gm. for such a period.

"The average daily protein ingestion for these same subjects, when permitted to select their diet, was 91.2 gm. or 1.33 gm. per kilogram of body weight."

The relation between the hourly excretion of nitrogen and its absorption in the intestine with reference to rest, work, and diuresis, E. HAAS (*Biochem. Ztschr., 12 (1908), No. 3–4, pp. 203–247, dgms. 26*).—Among the conclusions drawn from the investigations reported were the following: A curve representing the renal excretion of nitrogen for the first 8 hours after taking food shows 2 and sometimes 3 maxima. The first of these is chiefly due to flushing out nitrogenous cleavage products. Neither severe work nor absolute rest during the first 8 hours after taking protein had appreciable effect on the amount of nitrogen excreted during this period. The increased excretion of nitrogen with a larger volume of urine is also attributable to the flushing out of the system.

Fat cleavage with pancreas, E. BAUER (*Ztschr. Angew. Chem., 22 (1909), No. 3, pp. 97–100*).—On the basis of experimental data the author recommends

the use of beef pancreas instead of castor bean for the cleavage of fat. The method which he recommends for the estimation of fatty acids is outlined.

The influence of muscular and mental work on metabolism and the efficiency of the human body as a machine, F. C. BENEDICT and T. M. CARPENTER (*U. S. Dept. Agr., Office Expt. Stas. Bul. 208, pp. 100, figs. 3*).—The first of the two papers reports data of 19 experiments on the effects of muscular work on metabolism and the efficiency of the human body as a machine, and the second 44 experiments on the effects of mental work on metabolism. In all of these experiments the respiration calorimeter was used. The bicycle ergometer was used in the work experiments and is described.

From the data reported in connection with the experiments on muscular work the authors compute that as regards the effectiveness of the body as a machine it shows an efficiency of 20 per cent; that is, for every calorie of muscular work produced by the body a total of 5 calories is expended.

In the experiments on the influence of mental work on metabolism the students who served as subjects each took a more or less difficult examination in some college study while in the respiration chamber, comparison being made with a similar period in which the same subjects engaged in reading or copying some material which would demand little mental effort.

"From the results of the data accumulated in this series of experiments on the effects of mental work on metabolism it would appear that the pulse rate was slightly increased, the body temperature somewhat higher, the water vapor output increased by about 5 per cent, the carbon dioxid production increased by about 2 per cent, the oxygen consumption increased by about 6 per cent, and the heat production increased by about one-half of 1 per cent as a result of sustained mental effort such as obtains during a college examination. Of these factors, those most accurately measured are undoubtedly the carbon dioxid elimination and the heat production. On the whole, however, the increase of both of these factors accompanying the mental exertion is so small and the exceptions are so numerous that it would not be wise to say whether or not the mental activity exercised a positive influence on metabolic processes in general. Indeed, more than half of the subjects studied produced more heat in the control than in the mental work test, which might be considered as negative evidence. This is especially so when it is considered that although every precaution was taken to eliminate all other extraneous influences it still remains a fact that, with many of these subjects, the . . . [experimental period with mental work] was their first experience inside of a complicated respiration chamber and they were more or less disturbed by the novel experience, and perhaps more restless—that is, made more muscular movements than during the control period. In view of this fact, we are very strongly of the opinion that the results obtained in these experiments do not indicate that mental effort has a positive influence on metabolic activity."

The influence of oxygen inhalations on athletes, L. E. HILL (*Brit. Med. Jour., 1908, No. 2486, pp. 499, 500*).—Respiratory quotient experiments are summarized with both ordinary breathing and forced breathing of oxygen. In both cases, particularly the latter, the oxygen was a benefit in athletic contests.

"It has been proved conclusively that excess of oxygen does not increase the rate of metabolism of living matter. It is not a question here of fanning up the fire of life, but of assuring the athlete an adequate respiratory exchange in his muscle during his supreme efforts."

Oxygen as a substitute for training (*Illus. London News [Amer. Ed.], 44 (1909), No. 1138, pp. 289, 290, fig. 1*).—A very brief description of the use of oxygen by athletes in experiments by L. E. Hill (see above), with an illustration showing the way in which the oxygen is taken.

ANIMAL PRODUCTION.

The rôle of inorganic phosphorus in the nutrition of animals, E. B. Hart, E. V. McCollum, and J. G. Fuller (*Amer. Jour. Physiol., 23 (1909), No. 4, pp. 246–277*).—The object of these experiments was to determine whether inorganic phosphates could take the place of organic phosphates in a ration for growing swine.

In the first experiment 16 pigs, averaging 47 lbs. each in weight, were fed for 95 days a basal ration low in phosphorus, which consisted of rice, wheat gluten, and of wheat bran from which phytin, the organic form of phosphorus, had been removed by washing. The pigs which were fed the basal ration each received daily 1.12 gm. of phosphorus and made an average gain of 28.33 lbs., but though they gained in weight their limbs were weak and their appetites poor. Two lots of pigs that had precipitated calcium phosphate supplying daily 5.5 gms. and 2.75 gms. phosphorus, respectively, added to their basal ration gained in the same time an average of 52.6 lbs. per pig. The lot fed a normal ration of ground rice, whole bran, and wheat gluten that contained on an average 5.4 gms. of phosphorus in the daily ration gained an average of 59 lbs. in weight per pig. The final lot fed a normal ration of ground corn, ground oats, wheat middlings, and oil meal supplying daily 5.45 gms. phosphorus made an average gain of 65.5 lbs. per pig.

These experiments were repeated, but in addition two known tri-calcium phosphates were used. One was a bone ash, the other a crude ground phosphate rock (floats). During a portion of the experimental period one animal from each lot was placed in a cage and an accurate balance of the income and outgo of phosphorus was determined. The intake of phosphorus of the pig that received only the basal ration was 1.08 gm. daily, but the average amount retained was but 0.53 gm. daily, which was insufficient for complete nutrition. The average intake of total phosphorus in the lots receiving inorganic phosphates as a supplementary food was from 4 to 5 gm. daily. "The average amounts retained daily ranged from 1.5 gm. in the bone-ash fed pig to 2.35 gm. in the float-fed pig. There were days when the float-fed pig retained 3.11 gm."

Analyses were made of the feeds and of different parts of the slaughtered animals. The specific gravity and the breaking strength of bones were also determined. From data secured from the two experiments reported the following deductions are drawn:

"On the ration extremely low in phosphorus, pigs made as large gains up to 75 or 100 lbs. when starting at weights of from 40 to 50 lbs. as animals receiving an abundance of this element. After reaching this point loss of weight began, followed by collapse.

"When such low phosphorus rations as induced the above symptoms were supplemented with calcium phosphates, no untoward results appeared. Animals fed a low phosphorus ration, supplemented with inorganic phosphates, made as vigorous a development as others receiving their phosphorus supply wholly in organic form.

"Precipitated calcium phosphates, a mixture of di- and tri-calcium phosphates, gave no better results than did floats, a crude tri-calcium phosphate.

"Phytin as the supply of phosphorus gave no better results than the inorganic phosphates.

"A young animal of 40 lbs. weight receiving inorganic phosphates, together with other salts as supplementary to a ration very low in mineral constituents, grew to be an animal of 280 lbs. weight, bore a litter of fairly vigorous pigs, which on the same ration completed the cycle back to 80 lbs., while animals on the same ration less the inorganic phosphates collapsed in three months, with loss of weight accompanied by a loss of the use of their limbs.

"Determinations of calcium and phosphorus in the principal organs and tissues of the animals on the low phosphorus ration showed that they maintained the proportion of these elements constant and comparable to that of normally fed pigs.

"The percentage of ash in the skeleton of pigs on the depleted phosphorus ration was reduced to nearly one-half that of pigs receiving a normal ration, or a phosphorus-poor ration supplemented by an inorganic phosphate.

"The marked reduction in the quantity of ash of the bones of the animal receiving an insufficient supply of calcium phosphates, together with the ability of the animal to build up a skeleton very rich in calcium phosphate when an abundance of the latter is supplied in inorganic forms, strongly points to the possession of a synthetic power by the animal which enables it to convert inorganic forms of phosphorus into the organic forms demanded by its body.

"When the animals were starving for phosphorus, they drew this element from the skeleton, but removed calcium and phosphorus in the proportions found in tricalcium phosphate.

"The daily phosphorus supply for a 50-pound growing pig should be at least 3 gm. A supply of 4 to 5 gm. is probably a safer quantity.

"The data furnish no positive evidence of the synthesis of nucleo-proteids or other organic phosphorus-bearing complexes from inorganic phosphates in the animal body."

Experiments with powdered bone and ground chalk as feeds for swine, A. CARLIER (*Ann. Gembloux, 19 (1909), No. 3, pp. 166, 167*).—Three lots of 4 swine each were fed on the same basal ration for 114 days, except that ground chalk was added to the ration of one lot and precipitated bicalcium phosphate to another. The lots which received the chalk and phosphate gained, respectively, 124.5 and 157 kg., while those that received no supplementary mineral feed gained 170 kg.

The transformations in the phosphorus compounds in the hen's egg during development, R. H. A. PLIMMER and F. H. SCOTT (*Jour. Physiol., 38 (1909), No. 4, pp. 247–253*).—According to the authors the phosphorus in an unincubated egg is divided as follows: Water soluble organic phosphorus compounds 6.2 per cent, ether soluble bodies 64.8 per cent, vitellin 27.1 per cent, nuclein-like bodies 1.9 per cent, and a trace of inorganic phosphate. Tables are submitted which show the percentage of the different kinds of phosphorus in eggs at different periods of incubation. Until the fifteenth day there is little change in the distribution of phosphorus. At the end of the incubation period the distribution of phosphorus in the bodies of 3 chickens was as follows: Inorganic phosphorus 60 per cent, water soluble organic phosphorus compounds 8.6 per cent, ether soluble bodies 19.3 per cent, and nuclein-like bodies 12 per cent. The vitellin had disappeared, being probably changed at first into a water soluble compound, then into nucleic acid. There was a gradual absorption of the protein phosphorus bodies of the yolk by the developing chick before there was much change in the lecithin bodies.

"The whole work points to the conclusion that the glycerophosphoric acid gives rise only to inorganic phosphate in the developing chicken and is not transformed into any combination with protein. There is no evidence of a synthetic process occurring in the developing egg as regards the phosphorus compounds unless the probable transformation of the phosphoprotein into nucleoprotein be so considered."

The nature of the stimulus which causes a shell to be formed on a bird's egg, R. PEARL and F. M. SURFACE (*Science, n. ser., 29 (1909), No. 741, pp. 428, 429*).—This is an abstract of a paper read before the American Society of

Zoologists, at Baltimore, December, 1908, in which are reported investigations undertaken to determine the nature of the stimulus which excites the reflex activity of the shell-secreting glands.

"The oviduct was transected 1 or 2 cm. above the upper end of the 'shell gland.' The anterior portion of the oviduct was then ligated. The intestine was transected just anterior to the cloaca and the cloacal wall repaired by inversion of the stump and a purse string suture. Then the cut end of the intestine was anastomosed to the cut end of the oviduct ('shell gland'). As a result of this operation the feces must necessarily pass through the 'shell gland' on the way to the cloaca. In hens on which this operation has been performed a calcareous shell is deposited on the feces during their passage through the shell gland. The results obtained from these experiments are held to warrant the following conclusions:

"(1) The stimulus which sets the shell-secreting glands of the fowl's oviduct into activity is mechanical rather than chemical in nature.

"(2) The formation of a shell on the hen's egg is brought about by a strictly local reflex, and is not immediately dependent upon the activity of other portions of the reproductive system (nervous impulse of hormone formation)."

A Mendelian view of sex heredity, W. E. CASTLE (*Science, n. scr., 29 (1909), No. 740, pp. 395–400*).—In this article the author suggests an hypothesis by which the recent theories of Wilson, Correns, and Bateson on sex heredity are apparently harmonized. From recent investigations there appears to be a differential factor between male and female which is allelomorphic in the absence of that factor. It is inherited in Mendelian fashion and its presence is dominant over absence. "As regards the transmission of this factor we can recognize two distinct categories of cases:

"A. Femaleness is attained only when the differential factor is doubly represented in the individual. In such cases the female is a homozygote, and the egg invariably transmits the differential factor. Sex determination then rests with the male parent, for half the spermatozoa possess the differential factor and half lack it. The female is a homozygous dominant, not, as Correns supposed, recessive; whereas the male is a heterozygous dominant, pure recessives being unknown.

"B. Femaleness is attained whenever the differential factor is present in one only of the conjugating gametes which produce the individual. The gamete which transmits the differential factor is of course the macrogamete (egg), since this factor is not possessed by the male parent. The female is a heterozygous dominant, the male a pure recessive; homozygous dominants are unknown.

"The experimental proof for the existence of these two categories of cases has been produced for class A by Correns, and for class B by Doncaster and others. Cytological evidence which strongly supports the interpretation given to class A has beeen produced by McClung, Stevens, Morgan and especially by Wilson. This evidence is fully corroborated by the work of many others. Direct cytological evidence for the existence of class B is not known at present, but may confidently be looked for."

The author points out the importance of reciprocal crosses in the study of secondary sexual characters, and shows how it may be possible for these to be more common in the male even though the male be considered a retrogressive variation.

Australian saltbush (Atriplex semibaccata); its composition and digestibility. Notes on Russian thistle, W. P. HEADDEN (*Colorado Sta. Bul. 135, pp. 3–16*).—This bulletin discusses the value of the Russian thistle and the native

and Australian saltbush as feeds for stock, and reports 3 digestion experiments with the Australian saltbush.

Three young sheep were gradually accustomed to an exclusive ration of the saltbush, which had the following composition: Moisture 3.645, protein 20.6, fat 1.37, nitrogen-free extract 39.368, crude fiber 16.382, and ash 18.635 per cent. The average digestion coefficients obtained were as follows: Dry matter 60.48, protein 84.65, fat 24.46, nitrogen-free extract 63.83, crude fiber 27.30, and ash 59.64 per cent.

Australian saltbush was also fed green and as hay to horses. Some animals appeared to like it better than others. Analyses of different samples of the hay showed considerable variation due probably to the nature of the soil on which they grew.

"The following facts seem to have been established concerning this plant: First, when once established it will endure drought and even make a good crop with less than 5 in. of rainfall. Second, that stock will eat it or readily learn to eat it either green or as hay. Third, that it will produce very heavily under favorable conditions. Fourth, that it will, when fed alone, maintain the animals, and even better results are claimed for it. Fifth, that the hay is rich in protein, as rich or even richer than alfalfa. Sixth, that its coefficients of digestion are excellent, except for the fat or ether extract and crude fiber. Seventh, that it has no injurious effects on the animals even when they have no other fodder with it.

"The following facts, however, remain, that it has not become popular, and that when fed alone it does not produce the results that its composition and coefficients of digestion would seem to warrant us in expecting."

Another new fodder grass (Phalaris communtata), C. F. Juritz (*Agr. Jour. Cape Good Hope, 34 (1909), No. 1, pp. 26, 27, fig. 1*).—The composition of this grass when partially air-dried was found to be as follows: Water, 13.77; protein, 10.37; fat, 2.94; carbohydrates, 34.36; fiber, 23.96; and ash, 14.6 per cent.

Muskus grass and its feeding value (*Agr. Jour. Cape Good Hope, 34 (1909), No. 1, p. 39*).—The leaves and stems of muskus grass (*Erodium moschatum*) when flowering and seeding freely contain the following percentages: Water, 90.13; protein, 2.23; ether extract, 0.41; nitrogen-free extract, 4.44; crude fiber, 1.24; and ash, 1.6 per cent.

[Analyses of feeding stuffs], R. E. Rose (*Fla. Quart. Bul. Dept. Agr., 19 (1909), No. 1, pp. 6–8; 28–30; 81–107*).—The State chemist reports analyses of 240 feeding stuffs. Fifty-three samples were appreciably below guaranty in protein, 69 in starch and sugar, and 180 in fat.

Concentrated commercial feeding stuffs, R. E. Stallings (*Bul. Ga. Dept. Agr., 1908, No. 45, pp. 73–132*).—This report of the State chemist contains analyses of cotton-seed meal, linseed meal, gluten meal, gluten feeds, malt sprouts, dried brewers' grains, peas and beans, red dog flour, bran and middlings from wheat and rye, barley, corn, oats, rye, corn bran, and poultry and mixed feeds.

Analyses of feeding stuffs, F. W. Morse and B. E. Curry (*New Hampshire Sta. Bul. 140, pp. 231–236*).—Analyses of 74 samples of commercial feeding stuffs collected by the agent of the State board of agriculture are reported. The samples included wheat-mixed feeds, cotton-seed meal, linseed meal, gluten feeds, brewers' and distillers' grains, and hominy, molasses, flax, poultry and other miscellaneous mixed feeds.

Quality of the concentrated feeding stuffs offered for sale in New Mexico, R. F. Hare (*New Mexico Sta. Rpt. 1908, pp. 40–45*).—Analytical data are reported of shorts, wheat bran, cotton-seed and alfalfa meals, bald barley, oil cake, flour, and poultry and stock feeds.

Sixth report on concentrated feeding stuffs and cotton-seed meal, C. D. HARRIS, L. L. BRINKLEY, and J. M. PICKEL (*Bul. N. C. Dept. Agr., 29 (1908), No. 11, pp. 3–45*).—This bulletin reports the analyses of 497 samples of feeding stuffs, which include wheat bran, middlings, rice feeds, molasses feeds, beet pulp, hominy feeds, cotton-seed meal, and many mixed feeds.

Commercial feed stuffs, T. L. CALVERT (*Off. Rpt. Sec. Ohio Bd. Agr. on Com. Feed Stuffs, 1908, pp. 3–31*).—This report contains the text of the amended feeding stuffs law of Ohio and reports analyses of 146 samples of feeding stuffs, a large number of which are proprietary mixed feeds.

Animal husbandry in Denmark, 1908, A. APPEL (*Maelkeritid., 22 (1909), No. 4, pp. 67–82*).—An account of the general conditions of the industry during the year.

The Columbian cattle, C. O. GREGORY (*Rural New Yorker, 68 (1909), No. 3082, p. 182, fig. 1*).—This is a brief account of a new breed of dairy cattle which originated in New York from native stock and has characteristic white markings on the back and abdomen.

The origin of the Dexter-Kerry breed of cattle, J. WILSON (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1909), No. 1, pp. 17, pls. 4*).—The substance of this article has been previously noted (E. S. R., 20, p. 778).

Sheep husbandry (*Verslag. en Meded. Dir. Landb. Dept. Landb., Nijv. en Hendel, 1908, No. 3, pp. 70, pls. 19, dgms. 4, map 1*).—This is a report by the director of agriculture on the sheep and wool industry of Holland.

[Sheep breeding and feeding], F. W. WILSON (*Arizona Sta. Rpt. 1908, pp. 347–350*).—The Tunis-native cross produces a good fleece, though rather coarse, of long staple and with few long hairs and is an improvement over the Tunis sire in quantity and quality. It is heavier than the native fleece produced under the same conditions. The length of staple is intermediate between the Tunis and native. The average weight of the fleece from 6 animals was 10.5 lbs., as compared with 9.58 lbs. for 6 native animals.

"There is more yolk in the fleece than was expected, but this fact may be attributed to the abundance of feed and the peculiar climatic conditions of our southern irrigated valleys. . . . The first cross of Tunis on the native ewes produces a hardy, active, early maturing lamb that stands the warm weather well and produces a profitable quantity of wool. Out of more than 70 Tunis-native lambs only 2 have been of the same type as the dam. This cross shows uniformity in conformation, in characteristics of the fleece, and in weight."

The average weights of the Tunis-native crosses at birth, 6 months, and at the end of a year are slightly higher than those of the native.

The value of ripe olives was tested as a supplementary feed to alfalfa. Two wethers fed on alfalfa alone made an average gain of 3.66 lbs. in 1 month, as compared with an average gain of 16 lbs. with 2 wethers that received olives as a supplementary ration. "Since sheep do not injure mature trees while feeding on the waste olives, it would seem from the above experiment that they might act as excellent scavengers in olive orchards, utilizing feed that is ordinarily wasted."

Report of the wool specialist, J. A. HILL (*Wyoming Sta. Rpt. 1908, pp. 55–67*).—The investigations on wool have dealt with the shrinkage of wool in scouring and the relation of the breaking strain to the diameter of the wool fiber. The wool scouring results show a wide difference of shrinkage in the wools of Wyoming. In 1907 the shrinkage ranged from 55.9 to 77.9 per cent.

Preliminary to a study on the effect of dips on the tensile strength of wool a study was made on the strength of the fiber. The mean breaking strain of 1,000 separate fibers of a wool which seemed to be of average strength was 11.014 gm., but there was such wide variation that no reliable conclusions could be drawn

concerning the effects of dips on tensile strength. To see if the relation between breaking strain and diameter of fiber was more reliable 1,000 fibers of a Pennsylvania half-blood sheep were tested. The means of the separate hundreds gave an average breaking strain of 6.769 gm., the diameter of the fibers being 22.17μ. From the results obtained it is concluded that the breaking strain is more nearly proportionate to the diameter than, as might be supposed from the laws of mechanics, to the square of the diameter.

A series of calculations was made to determine the number of tests necessary to give the tensile strength of a sample of wool with sufficient accuracy for the dip studies by using the standard deviation of the sample as a basis on which to calculate the probable error for any given number of tests. From the tabulated data "it can be seen that the reliability of the approximate mean as compared to the true mean, which is shown by the decrease of the probable error, increases quite rapidly from 100 to 700. This increase in reliability is relatively slower, showing that there is very little gain in reliability by increasing the number of tests to above 700. Since, however, it is better to test too many than too few, and since 1,000 is a very convenient number to use in making calculations, it is quite probable that 1,000 [fibers] will be the number used unless further experiments show that some other number is better."

Both the breaking strain and the diameter of each fiber should be measured, "but taking into consideration the fact that it requires more than twice as much time to measure both the breaking strain and diameter as it does to measure only the former, it is plain that it is more economical to test 1,000 fibers for the breaking strain alone than to test 600 for both."

A laboratory method of scouring wool, A. E. Vinson and W. H. Ross (*Arizona Sta. Rpt. 1908, pp. 367–370*).—The authors advise a preliminary washing in clear water when the amount of sand and dirt is to be determined. The stock scouring solutions recommended are much weaker than those ordinarily used by wool scourers. The method, which is described in detail, gave lower results than the tub method of using the whole fleece.

"From these results it appears that the yield of pure dry wool by the laboratory method, using a small sample, corresponds closely with that obtained by scouring the whole fleece with the same solution."

Pork production at the Delta station, J. W. Fox (*Mississippi Sta. Bul. 107, rev. ed., pp. 7*).—To this revised edition (E. S. R., 19, p. 1170) is appended a brief note of experiments on the value of peas for pork production and as a fertilizer when planted in corn at the last working.

"After the corn was gathered, 51 spring pigs were turned into the pea field of 17 acres. They had no additional feed. The gain made from the peas was 2,893 lbs., or 170 lbs. per acre. At 6 cts. per pound, this gives a value for the peas of $10.20 per acre. And this is net, as the hogs did their own harvesting. Also the manure and humus from stalks, vines, and seed were left on the land. By tests made at the station for two years to determine the value of peas grown in corn, as a fertilizer, it has been found that they increase the succeeding cotton crop by 110 pounds of lint per acre. The land used was old and had been cropped continuously in cotton. A prolific short variety of cotton was used in the test. Figuring the increase at 9 cts. per pound, the peas had a fertilizing value of $9.90 per acre. The above eloquently suggests a means of improving our lands, worn by a one-crop system, at a profit instead of an expense."

Poultry problems and profits, W. L. Nelson (*Missouri Bd. Agr. Mo. Bul., 6 (1908), No. 12, pp. 52, figs. 16, dgms. 4*).—This bulletin was prepared for the use of those interested in practical poultry culture. The information contained

therein was obtained largely from Missouri poultry raisers and from investigators at a number of the experiment stations.

A colony house. A trapnest, J. DRYDEN and A. G. LUNN (*Oregon Sta. Circ. 4, pp. 7, figs. 2, dgm. 1*).—This circular briefly discusses the advantages of the colony system of keeping fowls. Details are given for the construction of a colony house 7 by 12 ft. A house of this size will accommodate 30 to 40 fowls and it can be easily moved. Directions are also given for making the trapnest now in use at the station.

Frog industry in France, F. H. MASON and H. L. WASHINGTON (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3446, pp. 1–7*).—These consular reports from different cities of France describe methods of propagation, catching, packing, transporting, and marketing the edible frog.

DAIRY FARMING—DAIRYING.

A chemical and physical study of the large and small fat globules in cows' milk, R. H. SHAW and C. H. ECKLES (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 111, pp. 16, figs. 2*).—This is a preliminary report on the influence of various factors upon the chemical composition of milk, undertaken at the Missouri Station in cooperation with the Dairy Division of this Department. Samples of milk were taken from Jerseys, Holstein-Friesian, Ayrshire, and Shorthorn cattle. The large globules were separated from the small globules as far as possible by the gravity process and by running through a separator. The daily yield, percentage of fat, and percentage of globules of different sizes are given. The color, specific gravity, melting point, refractive index, saponification, iodin, Reichert-Meissl, and Hehner values were determined, but no appreciable differences were found between the large and small globules.

On the modifications of milk globules, G. ALESSI and E. CARAPELLE (*Gior. Sci. Nat. ed Econ. [Palermo], 26 (1908), pp. 137–155, pls. 2*).—Studies are reported of the morphological alterations of the fat globules of the milk from goats, guinea pigs, dogs, and human beings under pathological conditions.

The composition of the milk of the dairy cow and buffalo in the Malay Peninsula, B. J. EATON (*Agr. Bul. Straits and Fed. Malay States, 8 (1909), No. 1, pp. 15–22*).—The amount of fat in the samples of milk from 25 native cows varied from 1.5 to 4 per cent. The average was 4 per cent of fat and 9.03 per cent solids-not-fat. The composition of milk from 25 buffalo cows averaged 6.8 per cent fat and 10.09 per cent solids-not-fat. "Buffalo milk is of a bluish-white color and the fat obtained from this milk is white and produces a white butter, and yet many samples contained as much as 8 or 9 per cent of fat."

Annual report of the Kirkee civil dairy, 1907–8, J. B. KNIGHT (*Dept. Agr. Bombay, Ann. Rpt. Kirkee Civ. Dairy, 1907–8, pp. 13*).—This report contains the individual records of a herd which consists of 54 cows and 50 buffaloes. The average yearly yield of the cows was 1,844 lbs., and of the buffaloes 1,886 lbs. of milk.

The enzyms of cow's milk, J. W. ENGLAND (*Amer. Jour. Pharm., 81 (1909), No. 4, pp. 177–181*).—This is a résumé of some recent work on this subject.

Lactic fermentation in milk, M. W. BEIJERINCK (*Arch. Néerland Sci. Exact. et Nat., 2. ser., 12 (1908), No. 3–4, pp. 356–378; abs. in Bul. Inst. Pasteur, 6 (1908), No. 20, p. 912; Jour. Roy. Micros. Soc. [London], 1908, No. 5, p. 636*).—The author divides the lactic-acid bacteria into classes according to the temperature which is most favorable for their growth. Those in which the optimum growth takes place between 5 and 20° C. constitute the cryoflora.

The type is represented by *Bacillus aromaticus* and its varieties which produce a mucilaginous fermentation. The typical representative of the mesoflora is *Lactococcus lactis*, which thrives best between 20 and 25°. The lacto bacillus is the representative of the thermoflora, or those which thrive best from 35 to 45°. Methods for growing pure cultures of the different species are described.

[The coagulation of milk by rennet obtained from Carica papaya], C. GERBER (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 8, pp. 497–500; Compt. Rend. Soc. Biol. [Paris], 66 (1909), Nos. 5, pp. 227–229; 8, pp. 366–368*).—This rennet resists high temperatures. It can coagulate either raw or cooked milk at all temperatures between 0 and 100° C., but its optimum action takes place at 80°. The action is accelerated by the addition of hydrochloric acid and retarded by sodium hydroxid. At temperatures below 10° its action is retarded by calcium chlorid and sodium chlorid. Above 10° it is accelerated by calcium chlorid and by small amounts of sodium chlorid.

Investigations on the bactericidal properties of milk and on adaptable forms of Bacillus coli communis during the bactericidal phase, V. BRUNDY (*Centbl. Bakt. [etc.], 2. Abt., 22 (1908), No. 7–10, pp. 193–222; abs. in Chem. Zentbl., 1909, I, No. 4, pp. 306, 307*).—The author found that 4 different types of coli bacteria in fresh milk gradually decreased in number during the first 12 hours. A high sugar content increased the germicidal properties of milk. Evidence is cited to show that the destruction of the bacteria can not be due exclusively to unequal osmotic pressure of the medium and the bacterial cell. In discussing the toxic effect of milk in the light of modern theories of immunity, the author points out the probability that alexin or other antibacterial substances which circulate in the blood of the udder pass into the milk and remain active at low temperatures from 12 to 24 hours after the milk is drawn.

A milk-borne outbreak of typhoid fever traced to a bacillus carrier, L. L. LUMSDEN and W. C. WOODWARD (*Jour. Amer. Med. Assoc., 52 (1909), No. 10, pp. 749–752, dgm. 1*).—This outbreak of typhoid fever in the District of Columbia was traced to a person who is apparently either a chronic typhoid bacillus carrier, possibly for 18 years, or an acute bacillus carrier immune to the disease. If the sanitary arrangements on the farm had been better or the milk had been pasteurized the outbreak would probably not have occurred.

The incidence of tubercle bacilli in New York City milk, A. F. HESS (*Jour. Amer. Med. Assoc., 52 (1909), No. 13, pp. 1011–1016*).—It was the author's purpose to study the nature, frequency of occurrence, and effect on children of virulent tubercle bacilli as found in the milk of a large city like New York. In 17 out of 107 samples obtained from 40-qt. cans, the presence of tubercle bacilli was demonstrated by animal inoculation. Bacilli were also found in 1 out of 8 samples of commercial pasteurized milk. Pure cultures were made from 8 samples of milk, of which 7 proved to contain bacilli of bovine type. In 1 case a human strain was isolated. The health of 18 infants and children known to have ingested virulent bacteria was followed for 1 year. They seemed to be in average health, though 4 out of 16 reacted to a conjunctival tuberculin test.

From these investigations the author states that it would seem that the bovine type of tubercle bacilli, although less virulent, is capable of infecting human beings and that children are more susceptible to it than adults. Although over 90 per cent of the cases of tuberculosis may be due to infection from human beings, he believes that as a safeguard against bovine infection milk not coming from tuberculin-tested cows should be pasteurized.

Report on the Danish pasteurization law, 1907–8 (*Mælkeritid., 22 (1909), No. 6, pp. 138–152*).—During the year 1,348 different creameries were inspected for the purpose of ascertaining how far they conformed to the provisions of the law as to pasteurization of skim milk, buttermilk, and cream. Of 14,617 sam-

ples collected during the year about one-half were skim milk. In all 480 samples were tested and 3.7 per cent of the skim milk and 2.9 per cent of the buttermilk and cream were found to have been insufficiently heated. No violations occurred in the case of 73 per cent of the creameries.

Whey cheese ("mysost"). S. Hals (*Tidsskr. Norske Landbr., 15 (1908), No. 12, pp. 551–557; Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 2, pp. 673–677*).—In recent years whey cheese has been largely made by evaporating the whey from "white cheese" (hvitost) and adding varying quantities of separator cream, either from goat's or cow's milk, whereas previously none or only a little cream or milk had been added. As a result the whey cheese is now considerably richer in fat and in casein, and lower in milk sugar and water than was the case in earlier years. The following average analyses of the two types of cheese are given:

Composition of whey cheese ("mysost").

	Older type.	New type ("fetost").
	Per cent.	*Per cent.*
Water	23.25	11.47
Protein (albumin and casein)	5.05	10.34
Milk sugar	50.74	43.40
Fat	14.65	30.43
Ash	6.31	4.36

Cheese making in Europe, E. H. Farrington (*N. Y. Produce Rev. and Amer. Cream., 27 (1909), Nos. 19, pp. 798, 799; 20, pp. 842, 843*).—This was an address before the Wisconsin Cheese-makers' Association in 1908, and contained observations and impressions on cheese making gathered from a trip through England, France, Holland, and Denmark. Methods of making Edam and Gouda cheeses are described in detail.

Annual report of the association for the development of the dairy industry of Hoorn, 1907, F. W. J. Boekhout (*Verslag Ver. Exploit. Proefzuivelboerderij Hoorn, 1907, pp. 59, pls. 4*).—This report includes notes on cheese making, pasteurizing, molasses feeds, and trials of a new pasteurizer and several new forms of milk strainers.

Review of the work of the 1907–8 season, W. M. Singleton (*New Zeal. Dept. Agr., Dairy Div. Bul. 11, pp. 53, pl. 1*).—This is the annual report of the dairy commissioner and contains statistics and miscellaneous notes on dairying and some data of experimental work on the cool curing of cheese and on the overrun of butter.

Pneumatic milk can (*Sci. Amer., 100 (1909), No. 13, p. 248, figs. 2*).—A description of a milk can which may be filled at the dairy and kept hermetically sealed until its contents have been removed. There is no exposure to dust or flies. Through the use of sterilized compressed air, the milk can be removed as needed by turning a valve, but no material can be added to the contents without breaking the lock.

VETERINARY MEDICINE.

Special pathology and therapy of domestic animals, F. Hutyra and J. Marek (*Spezielle Pathologie und Therapie der Haustiere. Jena, 1908, 2. ed., vols. 1, pp. XVI+1081, figs. 177; 2 pp. XIV+1042, figs. 142; rev. in Jour. Compar. Path. and Ther., 22 (1909), No. 1, p. 49*).—The second edition, like the first, previously noted (E. S. R., 18, p. 773), comprises two volumes. In the

light of recent knowledge many important chapters have had to be entirely rewritten, which has led to a considerable extension of the work.

The clinical pathology of the blood of domesticated animals, S. H. Burnett (*Ithaca, N. Y., 1908, pp. XI+156, pls. 4, figs. 24*).—In this work chapters are presented on the methods of examination, morphology of the formed elements, normal blood of the several domesticated animals, variations in red corpuscles and hemoglobin, and influences affecting the leucocytes. Chapters are also devoted to the special diseases of the blood, general and infectious diseases, specific infectious diseases due to bacteria and fungi, infectious diseases due to protozoa, diseases whose cause has not been definitely determined, and diseases due to animal parasites. A bibliography is given at the end of each chapter.

Leucocytes in invertebrates, M. Kollmann (*Ann. Sci. Nat. Zool., 9. ser., 8 (1908), No. 1–4, pp. 1–240, pls. 2, figs. 25; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 1, p. 33*).—The author has made an elaborate study of the leucocytes in representative types of invertebrates. He discusses the various kinds and in particular the development and rôle of granulated leucocytes.

Review of some of the recent advances in tropical medicine, hygiene, and tropical veterinary science, with special reference to their possible bearing on medical, sanitary, and veterinary work in the Anglo-Egyptian Soudan, A. Balfour and R. G. Archibald (*London, 1908, pp. 238; rev. in Jour. Compar. Path. and Ther., 22 (1909), No. 1, p. 50*).—This review has been written mainly with the object of enabling the medical and veterinary officers stationed in the Soudan to keep in touch with current literature, and especially with the more recent advances in tropical medicine, hygiene, and veterinary science. The subjects are dealt with in alphabetical order.

Chemo-therapy of trypanosomiasis (*Sleeping Sickness Bur. [London], Buls. 1, pp. 1–49; 2, pp. 86, 87*).—In this review the treatment of trypanosomiasis in man, the biological accommodation of trypanosomes to chemo-therapeutic agents and the treatment of experimental animals are considered. It is concluded that the use of atoxyl or any other trypanocide by itself has ceased to be justifiable. The combinatory method has the advantage that each drug can be used in doses much under those which are poisonous to the organism. Alternation of trypanocidal agents avoids the habituation of the parasites to a single remedy.

A bibliographical list of more than 200 titles is appended.

Notes on nagana and on some hematozoa observed during my travels, H. E. Durham (*Parasitology, 1 (1908), No. 3, pp. 227–235*).—Some cases of remarkable resistance to nagana infection are recorded. Although such birds as pigeons are unable to harbor *Trypanosoma brucei*, the kestrel is able to do so. Attention is drawn to certain changes which are brought about by the trypanosome infection and to the need for more precise chemical investigation of these hematozoal diseases.

Sensibility of fowls to the trypanosome of dourine, W. L. Yakimoff and Nina Kohl (*Centbl. Bakt. [etc.], 1. Abt., Orig., 47 (1908), No. 4, pp. 483–486; abs. in Bul. Inst. Pasteur, 6 (1908), No. 23, p. 1032*).—The authors injected 4 fowls, 2 subcutaneously and 2 intravenously, with blood from infected guinea pigs. Only 1 of the 4 fowls was affected, this one having been inoculated subcutaneously. Its blood was found to be infectious (for mice) 10 and 46 days after the inoculation.

Trypanosomiasis and other diseases in camels, with experiments in connection with the former, J. B. Cleland (*Jour. Dept. Agr. West. Aust., 17 (1908), Nos. 5, pp. 829–839; 6, pp. 970–979*).—This is a report of an investigation of trypanosomes from camels, 500 of which had been imported into the northern part of West Australia from Karachi, India. An account is given of the

spontaneous disease, probably surra, as manifested in camels and of the inoculated disease as manifested in horses, dogs, guinea pigs, and rats (*Mus alexandrinus*). Examinations were made of parasitic insects, etc., taken from the infected camels.

Sarcosporidiosis, E. A. Watson (*Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 1–10, pls. 2*).—"The parasite sarcocystis under certain conditions becomes a very important factor in disease, invading the entire musculature of its host with serious or fatal consequences.

"Sarcosporidiosis may be closely associated with, and is probably a very frequent sequel to, the disease of horses and cattle known as 'loco disease.' It may complicate the diagnosis of this disease, and also of dourine, and probably of some others, and retard or prevent recovery from these and similar cachectic conditions.

"The crescentic spores of sarcocystis bear a striking resemblance to the 'crescentic bodies' that have been described as developmental forms of trypanosomata, and it would be unsafe or quite erroneous to diagnose an infection by the latter from the presence alone of these 'crescentic bodies.'"

Annual report of the stock department, J. Mills (*Jour. Dept. Agr. West. Aust., 17 (1908), No. 6, pp. 951–960*).—Imported camels found to be infected with surra are said to have been destroyed. The further spread of the cattle tick resulted in severe outbreaks of tick fever. Other diseases reported are tuberculosis, epizootic pleuro-pneumonia, and swine fever.

Some animal diseases, G. H. Glover, C. L. Barnes, and B. F. Kaupp (*Colorada Sta. Bul. 137, pp. 3–12*).—This is a popular discussion in which information is presented on the diseases of most importance at the present time.

Sore mouth disease, known as necrotic stomatitis, is said to have been a veritable scourge among hogs during the last 15 months. Lip and leg ulceration, or necrotic dermatitis of sheep, caused by *Bacillus necrophorus*, the same organism that causes sore mouth disease, is a disease that has recently appeared in the West.

The different loco weeds are said to take first place from the standpoint of the disaster wrought to the live stock interests of the State. The 3 or 4 species of larkspur are by far the next most important weeds in Colorado, the loss caused by them amounting to about $50,000 annually.

Blackleg, or symptomatic anthrax, is shown by reports from 1,656 stockmen to cause the greatest loss in May, June, September, and October. Glanders, foot-and-mouth disease, and hog cholera are also briefly considered.

Report of the chief veterinary surgeon, J. M. Sinclair (*South. Rhodesia, Rpt. Sec. Agr. 1907, pp. 19–22*).—A brief report of the diseases occurring during the year. Particular mention is made of two serious outbreaks of African coast fever.

Diseases of animals and meat inspection in Western Australia, J. B. Cleland (*Jour. Dept. Agr. West. Aust., 17 (1908), No. 6, pp. 961–969*).—During the year 26,563 cattle, 356 calves, 185,554 sheep and lambs, and 9,336 pigs were examined; 13.7 per cent of the cattle, 7.5 per cent of the sheep, and 14.9 per cent of the pigs examined were found to have pathological lesions; 5.4 per cent of the cattle examined or 39.3 per cent of those diseased had tubercular lesions. A detailed list is given of the diseases met with.

Observations on poisoning in horses, cattle, and sheep caused by feeding with musty fodder, M. Müller (*Berlin. Tierärztl. Wchnschr., 1908, No. 31, pp. 541–544; Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 66–70*).—At the beginning of December, 1907, several outbreaks of disease of an enzootic character occurred in lower Alsace-Lorraine, affecting horses, cattle, and sheep. The principal symptoms consisted in myopathic paresis or paralysis, and in the

oxen and sheep in excessive salivation. The pulse and respirations were only increased in old standing cases. There was no fever and the sensorium did not appear to be affected. Occasionally animals recovered after a very long period of convalescence.

In post-mortem examination no visible pathological changes could be detected with the naked eye. Bacteriological examinations of the various organs appeared to indicate that the cases were due not to an infection but to an intoxication. Examination of the materials sent revealed the presence in greater or less quantities of cadaveric bacilli in all organs. The streptococci or other micro-organisms described by Schlegel, which are generally easy to discover, could not be detected in the interior of any of the organs. From inquiries it was found that during the previous year the grain of Essesdorf had been severely attacked by fungi. Microscopic examinations of the black mycelium showed that it was a form of *Puccinia graminis*.

An outbreak of poisoning from infected brawn, W. G. SAVAGE and C. H. GUNSON (*Jour. Hyg.* [*Cambridge*], *8* (*1908*), *No. 5, pp. 601–608*).—"Eighteen persons after eating a certain batch of pork-cheese, or vegetables infected from it, suffered from severe illness and three died. The illness was caused by a Gaertner bacillus of the Aertrycke subgroup isolated from one of the fatal cases. This bacillus was contained in the meat used for the pork-cheeses (brawn), infection being antecedent to preparation. Part of the meat was obtained from a pig suffering from local injury or disease of one leg and the bacilli were no doubt etiologically connected with this condition. The outbreak points to the need for a more complete and thorough veterinary inspection of meat before sale, and of the necessity for extended investigation into the diseases of animals used for human food caused by Gaertner bacilli."

Tetanus or "lockjaw," N. S. MAYO and E. L. LUÁCES (*Estac. Cent. Agron. Cuba Circ. 31, English Ed., pp. 11, pl. 1, figs. 2*).—An account is given of the cause and nature of tetanus. The disease is said to be very common in Cuba and to cause serious losses of horses and mules. Preventive measures and remedies are discussed.

Tuberculosis of the retropharyngeal lymphatic glands in cattle. L. SPARTZ (*Hyg. Viande et Lait, 2* (*1908*), *No. 6, pp. 241–243*).—An account by the director of the abattoir at Luxemburg.

Tuberculosis of these glands is found very often in animals slightly affected with pulmonary tuberculosis and occasionally when lesions can not be found in any other part of the body. Of 28 animals which during the last 5 months of 1907 were found to present lesions of the retropharyngeal glands, 7 showed no lesion elsewhere. This disease is generally local, the bacilli having penetrated directly by the lymphatics of the pharynx and not in consequence of a generalization by the blood stream. When the glands become tuberculous they increase in size and cause continuous irritation, the action upon the pharynx resembling that of a foreign body.

The author has never seen either cutaneous, osseous, or muscular tuberculosis in the head.

The nature and control of bovine tuberculosis. V. A. MOORE (*Vt. Bd. Health Bul., 9* (*1908*), *No. 2, pp. 12–29*).—The "nosing" of healthy cattle with infected animals and their feeding and drinking after them are stated to be the most usual methods of contracting the disease. There is no evidence that in cattle tuberculin excites a latent tubercle into activity or that it tends to make the disease worse.

For the eradication of the disease it is important that the dairyman have a source from which he can obtain sound animals. Three procedures from which to choose in eradication are, (1) the total destruction of the infected animals,

(2) their slaughter for beef under proper inspection, procuring the meat values of those that are only slightly infected, and (3) the application of the Bang method. It is stated that the third method has been applied in this country with success at the Wisconsin and New York State stations and by several private cattle owners.

It is the author's opinion that the offspring of tuberculous animals do not have any tendency to tuberculosis. Within a few weeks he has had tested 202 heifers between the ages of 18 months and 3 years, nearly all the offspring of tuberculous dams, with only one reaction, the post mortem in this case showing a very slight lesion.

Immunization of cattle to tuberculosis, A. WEBER and C. TITZE (*Tuberkulose Arb. K. Gsndhtsamt., 1908, No. 9, pp. 1–26; abs. in Bul. Inst. Pasteur, 6 (1908), No. 23, pp. 1039, 1040*).—In continuation of experiments previously noted (E. S. R., 19, p. 1082) the authors used the Koch-Schutz vaccine known as tauruman, which is composed of bacilli of the human type.

It was found that 10 to 15 days after the inoculation of an animal a fever develops, which continues high for 2 to 8 days and is accompanied by a cough and loss of weight. The resistance of animals inoculated at the age of 3 weeks was tested by intravenous and subcutaneous injections, inhalation and ingestion of tubercle bacilli, and by contact with diseased animals. None of the animals inoculated was afterwards found free from tuberculous lesions. The authors conclude that there is no marked difference in practice between bovovaccine and tauruman. Each can confer a resistance for a limited period.

Permanence of the human type of tubercle bacillus in the bodies of bovovaccinated cattle, A. WEBER ET AL. (*Tuberkulose Arb. K. Gsndhtsamt., 1908, No. 9, pp. 27–49; abs. in Bul. Inst. Pasteur, 6 (1908), No. 23, pp. 1040, 1041*).—Experiments are reported in which the bovovaccine of von Behring and the tauruman of Koch and Schütz were used.

Three months after intravenous injections of tauruman bacilli were found in the lungs, and the bronchial and mediastinal glands only; none was found after 7 months. With bovovaccine the persistence was not so long. It is concluded that the flesh of vaccinated animals should not be used for food within 4 months following inoculation.

Elimination of tubercle bacilli with milk after intravenous injection of the human type of the bacillus, C. TITZE (*Tuberkulose Arb. K. Gsndhtsamt., 1908, No. 9, pp. 50–58; abs. in Bul. Inst. Pasteur, 6 (1908), No. 23, p. 1041*).—The author first reviews the investigations that have been made by other workers. In the investigations here reported bacilli (typus humanus) were eliminated in the milk of cows that had been intravenously injected with tauruman.

In the first experiment the elimination commenced the third week and still continued after 144 days had passed. The bacilli were only found, however, in milk from the left hind quarter of the udder.

In the second experiment bacilli were not eliminated in the milk even after a second injection, made 3 months after the first (typus humanus) with bacilli of the bovine type. After a third injection (typus humanus) bacilli appeared in the milk from the left hind quarter of the udder.

In a third experiment bacilli were eliminated in the milk from the left hind quarter of the udder 24 hours after injection, but none appeared after the ninety-ninth day. In another instance the elimination of the bacilli is said to have continued for 16 months.

Tuberculin as a diagnostic agent, W. JOWETT (*Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 10–22*).—A resumé of the new methods of diagnosis by means of local applications of tuberculin.

Abstract of the proceedings of the conference on animal tuberculosis at the University of Illinois, October 15, 1908 (*Illinois Sta. Circ. 128, pp. 16*). Following a brief report of a conference held at Urbana, Ill., for the consideration of animal tuberculosis, the more important points in the control of the disease in animals are discussed at length.

Measures for the eradication of bovine tuberculosis in Germany. L. Brante (*Malmö. Läns Hushåll. Sällsk. Kvrtlsskr., 1908, No. 3, pp. 662–688, figs. 4*).—A report presented to the Malmohus County Agricultural Society.

Tick, redwater, or Texas fever in cattle, R. Wallace (*Queensland Agr. Jour., 20 (1908), No. 6, pp. 314–325, pl. 1, figs. 4*).—A general review of the present status of our knowledge of the disease and of the ticks that transmit it, with methods for tick extermination.

The foot-scab mite of sheep (Symbiotes communis, var. ovis), T. W. Cave (*Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 50–52, fig. 1*).—The author presents an account of this parasite as occurring in a flock of yearling lambs at Kent, England. Acari were found in the feet of all lambs that appeared lame. The parasites showed no tendency to invade other parts of the body, remaining attached to the skin of the interdigital space and the short wool growing from it. Washing the feet with a 2 per cent solution of lysol was effective in destroying the parasites.

Hog cholera and hog-cholera vaccine, M. H. Reynolds (*Minnesota Sta. Bul. 113, pp. 255–284*).—The first part of this bulletin is devoted to an account of hog cholera in the light of recent knowledge, while in the remainder is presented the details of immunity experiments conducted by the author in which both the serum alone and serum-simultaneous methods were employed. The following conclusions have been drawn, based upon these experiments:

"In herds already infected we have vaccinated 251 hogs, of which there died 44 (corrected for December 28, 1908). In these same infected herds there were unvaccinated 76, of which there died 68.

"Of healthy hogs, i. e., hogs not yet exposed to infection so far as known, we have vaccinated 201, of which there died 2, neither showing any satisfactory evidence of cholera. . . .

"In the same herds, healthy at the time of vaccination, there were 9 animals left unvaccinated for various reasons, usually for checks. These 9 under the same exposure as the 201 vaccinated, all died.

"Our present standard of doses is as follows:

"Serum.—Up to 20 lbs., 10 cc.; 20 to 50 lbs., 15 cc.; 50 to 100 lbs., 20 cc.; 100 to 150 lbs., 25 cc.; 150 to 200 lbs., 30 cc.; 200 to 250 lbs., 40 cc.; 250 to 400 lbs., 50 cc.

"The dose of virulent blood is from 2 to 2.5 cc. with the exception of suckling pigs, for which 1 cc. is sufficient with 10 cc. of serum.

"The writer feels warranted in saying that we can now immunize hogs so as to make them proof against cholera.

"The method discussed in this bulletin has progressed to a point where it may be considered a practical method of field vaccination.

"This serum has excellent keeping qualities, it having been proved potent after several years."

The indications are that the danger of disseminating the disease through the use of virulent blood is slight and may probably be disregarded. "This vaccine has still certain faults, the correction of which will add greatly to its desirability. These faults are such that it seems probable that they can be removed in a large measure."

Concerning the cost of vaccine the author states: "From the best available information we estimate that the serum must sell at first for about 2 cts. per

cc., or 20 cts. for enough to vaccinate a suckling pig. . . . The virulent blood which forms a part of the vaccine will probably sell at approximately 1 ct. per cc. This will add from 1 to 3 cts. to the cost of each dose when the simultaneous method is used. The cost of vaccinating a hog weighing 100 lbs. at this rate would be about 42 cts. at the present cost of production. But when the serum is produced on a much larger scale, and we have improved our methods and learned to economize to the best advantage, the carcasses of hogs used up in our work, we expect to produce this vaccine for perhaps 25 cts. for a full dose. At 40 cts. or even at 50 cts. a dose the dose would be very cheap for herds of exposed pure-bred hogs and for use in checking outbreaks."

Methods of controlling hog cholera, M. H. REYNOLDS (*Northwest. Agr., 24 (1909), Nos. 8, p. 193; 10, pp. 247, 248*).—In this address, which was presented before the Minnesota Live Stock Breeders' Association, the author reviews the present status of our knowledge of hog cholera and discusses the investigations of the station noted above.

Studies of conditions relating to catalepsy of swine, C. H. HANSEN (*Maanedskr. Dyrlæger, 20 (1908), No. 13, pp. 353–369; abs. in Hoard's Dairyman, 40 (1909), No. 1, p. 10*).—The report gives data relative to investigations along the following lines of study: The influence of cod-liver oil on the quality of pork, the poisonous effect of phosphorized cod-liver oil in the case of healthy swine, the influence of phosphorized cod-liver oil on the deposition of lime salts in the organism, and the keeping quality of phosphorized cod-liver oil.

Some colic cases in town horses, H. LOMAS (*Vet. Rec., 21 (1909), No. 1070, pp. 441–443*).—This account is based upon 1,244 cases among general work horses.

The author considers the increased work during certain months and poor provender the important causative factors. That there is a direct relation between hard work and death from twists and volvulus he considers quite evident. The death rate is considered as very largely controlled by the age of the horses and the work exacted. "Old horses—horses over $3\frac{1}{2}$ years' service—have colic, but the death rate is very low indeed as compared with those of shorter service." The majority of the twists have been at the commencement and termination of the large colon.

Glanders, W. HUNTING (*London, 1908, pp. 100+4, pls. 14*).—In this work the author first considers the history of glanders and then deals with its distribution and prevalence, etiology, symptoms, post-mortem appearances, diagnosis, cure and recovery, prevention, and legislation. An appendix is devoted to glanders in man.

Observations indicating that the recent outbreak of diphtheria in the wood-pigeon (Columba palumbus) is caused by a filter-passer, G. DEAN and W. E. MARSHALL (*Jour. Path. and Bact., 13 (1908), No. 1, pp. 29–33*).—From inoculation experiments here recorded it appears that an extract of the membrane after filtration through a Berkefeld filter still contains the virus. This reproduced the disease when inoculated upon the throat, whereas when subcutaneously inoculated an acutely fatal disease without any definite pathological lesions was produced.

Note on the prevalence of intestinal worms in dogs in Cambridge, G. H. F. NUTTALL and C. STRICKLAND (*Parasitology, 1 (1908), No. 3, pp. 261, 262*).—In the course of investigations conducted at Cambridge, England, upon dogs infected with *Piroplasma canis* 24 were examined for intestinal parasites. All were found to harbor worms. Of the 3 species of parasites found, 17 dogs harbored *Ascaris mystax*, 14 harbored *Dipylidium caninum*, and 4 harbored *Tænia serrata*. The number of *A. mystax* per dog varied from 1 to 113, while *D. caninum* varied from 1 to 102, and *T. serrata* from 1 to 8. The total number

of each species recovered from the 24 dogs was *A. mystax* 296, *D. caninum* 312, and *T. serrata* 17.

Hepatozoon perniciosum (n. g., n. sp.); a hemogregarine pathogenic for white rats; with a description of the sexual cycle in the intermediate host, a mite (Lelaps echidninus), W. W. MILLER (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 46, pp. 51, pls. 20*).—"*Hepatozoon perniciosum*, n. g., n. sp., is a hemogregarine found in white rats in Washington, D. C., and the cause of an epizootic observed among these animals. The protozoon is conveyed by a mite (*Lelaps echidninus*), which is the true intermediate host. Infection is transmitted to the rat when the mite is swallowed by the rat. The mites are ectoparasites upon the rats, from which they receive infection by sucking the blood. Multiplication of the hemogregarine in the rat takes places in the liver. In the stomach of the mite the hemogregarines conjugate and form an ookinet, which penetrates the stomach wall and completes its development in the body tissues of the mite."

A new rabbit cestode, Cittotænia mosaica, M. C. HALL (*Proc. U. S. Nat. Mus., 34 (1908), pp. 691–699, figs. 6*).—A new species of tapeworm taken from a rabbit (*Lepus [Sylvilagus] pinetis*) in Colorado is here described as *C. mosaica*. This is said to be the only genus of rabbit cestodes represented both in the Old World and in America.

The principles involved in the standardization of disinfectants and the influence of organic matter upon germicidal value, HARRIETTE CHICK and C. J. MARTIN (*Jour. Hyg. [Cambridge], 8 (1908), No. 5, pp. 654–697*).—Experiments made with phenol, mercuric chlorid, and emulsified disinfectants to determine their effect in the presence of definite amounts of organic material are here recorded. A modification in the methods commonly employed for the standardization of disinfectants is suggested. A bibliographical list of 37 titles is appended.

Wounds of animals and their treatment, N. S. MAYO and W. W. DIMOCK (*Estac. Cent. Agron. Cuba Circ. 29, English Ed., pp. 15, figs. 4*).—A popular account prepared for the stock owner.

RURAL ENGINEERING.

Clearing pine lands, E. B. FERRIS (*Mississippi Sta. Bul. 118, pp. 3–11, figs. 3*).—This bulletin discusses briefly the removal of stumps from pine lands by digging and cutting, burning, blasting, and pulling, and describes the devices used. Other methods such as filling auger holes in the stump with nitrate of soda, kerosene, and strong acids have been tried, but are not considered practical.

The cost of clearing 35 acres at the station in 1902 by blasting and burning averaged $17 per acre, but in recent experiments on 2.3 acres of land having 158 stumps requiring boring, a simple machine was used to bore the holes and then firing, this reducing the cost per acre to less than $8. The bulletin includes a description of this boring machine.

The cost of clearing logged-off land for farming in the Pacific Northwest, H. THOMPSON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 25, pp. 16, figs. 9*).—This is a summary of information obtained from contractors and owners in western Washington, western Oregon, and northern California. Various methods of removing stumps are described, with tabulated data of costs. The methods described include pulling with the donkey engine, burning, and blasting, and these are illustrated by diagrams showing the best way to employ them. There are three tables, the first giving an approximate estimate of the extent of cultivated, timber, and logged-off lands; the second, of the cost per stump of removing fir stumps; and the third of the cost per acre of clearing

by various methods. The cost averages about $100, indicating that clearing of these lands is profitable only on very rich land or that located near cities.

Seepage and drainage, II, E. T. TANNATT and R. D. KNEALE (*Montana Sta. Bul. 76, pp. 111–162, pls. 14, figs. 2*).—In continuation of the experimental work reported in Part I of the investigations (E. S. R., 19, p. 285), this bulletin gives the results of studies by the authors to determine the cause and amount of seepage from irrigation canals, and the best methods of draining the lands injured by the water. The results reported here were obtained chiefly from two sources: First, from drainage plans and investigations made of a tract of 80 acres of seeped land near Bozeman, Mont.; and, second, from the investigations of the Arnold drain which is about 16,300 ft. long and drains an area of some 5,288 acres near Billings, Mont.

For the first of these, which is called the Lamme project, a topographical survey and study of the subsoil conditions was made, the latter being determined with the aid of 135 test wells, which were also used for observations of the ground water level. The principal conclusions arrived at from the study of this project were that the open ditch laid parallel to the floor of the ground water and used for an intercepting drain is not satisfactory in clay soils underlaid by gravel; that the relief system is best adapted to these conditions, and that the drains should be laid with reference to the surface of the gravel subsoil. In alkali soils open-bottom box tile is preferred to closed tile because of the danger of the joints being cemented, as was noted in Part I.

The soil along the Arnold drain was a stiff clay with a gravel subsoil irregular in surface, and the ground water was under pressure, as indicated by test wells which were driven through the clay along the line of the drain. The investigation of this drain confirmed the conclusions noted in the Lamme project. A summary of the conclusions reached from the study of this drain is given, with practical suggestions relating to the location, grades, and material for drains, and the relation of gravel to seepage.

In studying seepage losses it was found difficult to secure accurate measurements because of additions to the flow reaching the canal en route. Tabular results of measurements in an irrigation canal 28 miles long are given showing the total and percentage losses in sections of the canal. The total loss was found to be 27 per cent of the amount entering the headgates; 20.3 cu. ft. per second were lost, and 3.5 cu. ft. per second entered the canal.

McGee Creek drainage and levee district (*Engin. Rec., 59 (1909), No. 8, pp. 221, 222*).—This is a paper read before the Illinois Society of Engineers and Surveyors, in which A. H. Bell, the engineer of this district, describes the mechanical equipment and other features of this district. About 12,000 acres of very rich bottom land fronting 9 miles on the Illinois River are to be reclaimed by levees and pumping.

The pumping equipment consists of two horizontal return tubular boilers of 175 H. P. each, and two pumping units each including a 4-valve horizontal simple noncondensing engine with 20-in. stroke and 16-in. cylinder with a steam consumption of 26 lbs. per I. H. P., and rated at 225 H. P. each, when running at 180 revolutions per minute with a steam pressure of 125 lbs. The pumps are of the centrifugal type with 36-in. suction and 32-in. discharge, are direct connected to the engines, and are designed to deliver 28,500 gals. per minute at 125 revolutions per minute against a 9-ft. head, or at 200 revolutions per minute against an 18-ft. head. The maximum suction lift is 10 ft. and the discharge head 8 ft., making the total of 18 ft., all including friction. The cost of the entire district will be $189,000.

Assesments on railroads in land drainage districts, J. W. DAPPERT (*Engin. Rec., 59 (1909), No. 7, pp. 176, 177*).—Assessing railroads for benefits derived

from drainage was the subject of a paper read recently before the Illinois Society of Engineers and Surveyors, and there are given in this article notes from the paper regarding suggestions as to benefits which can be assigned exact money values. Examples of this are as follows:

A tile laid where there was previously an open drain would save the railroad the cost of removing and replacing a bridge, and the temporary traffic delay necessitated by the passage of a dredge boat. Trestles or bridges can be dispensed with as a result of the drainage, or perhaps shortened or replaced by structures less expensive to maintain. In illustration of these methods an actual case is cited.

The works of irrigation in the United States, D. J. Nicolau and D. N. Puig de la Bellacasa (*Las Obras de Riego en los Estados Unidos de América. Madrid: Ministerio de Fomento, 1908, pp. 285, pls. 17, figs. 9, dgms. 71*).—This contains an account of the establishment and development of arid land reclamation in the United States. There is a discussion of the natural conditions and resources of this country, and of irrigation works and institutions, with detailed descriptions of some of the large irrigation structures.

Federal aid and laws relative to public lands and irrigation are treated at some length with reference to the possibilities of successful application of the methods used here to irrigation development in Spain.

[Duty of water on alfalfa fields], G. E. P. Smith (*Arizona Sta. Rpt. 1908, pp. 371–373*).—Measuring the duty of water on two alfalfa fields was begun in 1908. One of these fields, divided into plats A and B, contained 47.7 acres of heavy loam and was watered by a gravity ditch, while the other, containing 23.2 acres of clayey soil, was watered from a pumping plant. In the larger field plat A received 85.7 in. of water, or 19.8 in. per ton of alfalfa, and plat B 55.4 in., or 11.5 in. per ton of alfalfa, while the smaller field received 13.75 in. of water, or 5.7 in. per ton of crop. The heavy application on plat A was due to a mistake. The smaller field is regarded as having given the better results. In February and March 2.5 in. of rain fell, and in July and August 7 in.

Duty of water records, H. T. Nowell (*Wyoming Sta. Rpt. 1908, p. 70*).—A table is given showing the average depth of water in inches applied to 29 different crops and crop mixtures on irrigated plats at the station farm from 1902 to 1907, inclusive. Only the data for alfalfa include each of the 4 years.

Detecting underground streams with an ear-trumpet (*Sci. Amer., 100 (1909), No. 15, p. 277, figs. 2*).—The apparatus described and illustrated is based on the principle of the "acoustele," or sound trumpet. It consists of a large ear-trumpet set mouth down on the ground with a device for considerably magnifying sounds produced beneath it, such as running water. The instrument is stated to have been operated with success in the vicinity of Paris.

Concrete caisson wells, G. E. P. Smith (*Arizona Sta. Rpt. 1908, pp. 373, 374*).—A type of concrete caisson well is recommended for use where wells of great lateral dimensions are required by reason of the water supply being limited to shallow beds of gravel. There is given a brief description of a well of this kind built under the auspices of the station in 1908. This is 8 ft. in diameter and 24 ft. deep. It was built of reinforced concrete in 3-ft. sections on the ground, and these were successively sunk by excavating inside of them.

Power irrigation, E. C. Reybold, Jr. (*Irrig. Age, 24 (1909), No. 6, pp. 169–172, figs. 2, dgms. 2*).—A steam pumping plant designed to supply water for the irrigation of 1,000 acres of fruit land in Utah is described in this article, with data relative to its installation, operation, and cost.

During 1908 the number of acres irrigated was about 500, 350 of which was planted to trees, 75 to cantaloups, and about 75 to other crops. The pumps ran for about 1,540 hours during the season and discharged about 7 second-feet.

This furnished about 1.7 acre-feet per acre under cultivation. The estimated cost per acre when all the land is under water is $3.31 per acre. The system complete cost $16 per acre.

Implements and machinery at the Paris show (*Impl. and Mach. Rev., 34 (1909), No. 408, pp. 1503–1511, figs. 3*).—An account is given of the annual show held recently, and a number of the exhibits are described briefly. Among these is a new potato digger described as follows: "The digging apparatus is in the form of a scoop carried on a frame with large steel wheels, and supported in front by swivel wheels. A lever regulates the depth of scoop, which digs up the earth with the potatoes, and both are carried up by a chain elevator, when the soil is pulverized by the motion imparted and falls through the grid bottom. The potatoes being thus shaken free from soil roll up the elevator and fall from prongs into rows."

There was also noted a road roller which is propelled by an internal combustion engine, and is the outcome of experiments carried on for three years. The drive is taken through a multiple disk clutch reducing gear direct to the road wheels.

Electrical plowing tackle (*Impl. and Mach. Rev., 34 (1909), No. 407, pp. 1375, 1376, fig. 1*).—The plowing engine described and illustrated is fitted with a device for anchorage which consists of a plate the length of the machine carried by vertical channel sections sliding in brackets fixed to the frame. It is stated that when the point of this plate is forced into the ground, the machine, which weighs 4 tons, offers as much lateral resistance as the heaviest traction engine, enabling it to perform deep plowing.

Manure distributor, Sevegrand (*Rev. Vit., 31 (1909), No. 796, pp. 302–305, figs. 5*).—The distributor which is described and illustrated is stated to be designed especially to secure uniform distribution. This is accomplished by giving an oscillatory movement to a cylinder at the bottom of a hopper by means of two cranks actuated by gears attached to the axles.

[A water-weed cutter] (*Impl. and Mach. Rev., 34 (1909), No. 408, pp. 1496, 1497, figs. 3*).—A new machine for cutting water-weeds is described. One of the chief features is a stern wheel enabling it to turn in a little more than its own length. The cutting of the weeds is performed by an arrangement of weed saws in a V-shaped form, which is suspended from an oscillating hinged arm. The cutting knives, which are of steel with scalloped edges, trail along just above the bottom.

The Heath book for threshermen, W. Boss (*Winnipeg, 1908, pp. 312, figs. 55*).—This is an elementary treatise on the subject of boilers and engines of types used for traction and farm operations, and is intended to serve as a book of instruction for engineers and firemen or others having to do with this class of engines. The principles involved in engines and boilers, their construction and their fittings are described, together with practical suggestions as to their care and operation. The book is in the nature of a handbook and contains in addition to the above, tables of the properties of steam, weights and measures, and other engineering data.

Caterpillar traction engine (*Engin. News, 61 (1909), No. 7, p. 195, figs. 4*).—The essential feature of this machine is an endless platform driving belt which replaces the large drivers of the ordinary traction engine. It is stated to be especially adapted to the loose, dry soils of the deserts, the adobe clays, and the soft reclaimed lands bordering rivers. The construction and operation are described.

Farm building construction, R. Knoch (*Landwirtschaftliche Baukunde. Hannover, 1908, vol. 1, pp. 113, figs. 37; 1909, vol. 2, pp. 108, figs. 66*).—These

booklets deal with the construction of buildings, with special reference to those on the farm.

The first takes up building materials, the construction of common building details such as steps, stairs, floors, doors, etc., and also ventilation. The second is devoted to barns and stables, and describes in detail methods of construction which are considered to be best adapted to the purpose for which the building is erected.

The author, who is a government architect, states that the booklets were prepared for the use of the farm owner to acquaint him with enough technical information to enable him to build to the best advantage.

RURAL ECONOMICS.

The International Institute of Agriculture at Rome, H. J. DANNFELT (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 1, pp. 52–64*).—A sketch of the history, organization, field of operation, and administration of the institute.

The origin and organization of the International Institute of Agriculture at Rome, A. MACLEAN (*Ztschr. Agrarpolitik, 7 (1909), No. 3, pp. 118–124*).—Similar in scope to the above.

The small holding, F. E. GREEN (*London and New York, 1908, pp. XII+122, pls. 24, figs. 44*).—This book describes the operation of individual and cooperative small holdings in England with particular reference to cooperation, through which phase alone, according to the author, can the success of the movement be attained.

A list of societies helpful to small holders and a bibliography are included.

Equipment and cultivation of small holdings, J. H. DIGGLE (*Irish Farming World, 22 (1909), Nos. 1101, pp. 346, 347; 1102, pp. 376, 377*).—This article describes the actual cost of equipment of several blocks of land in England formerly cultivated as single holdings, but now divided and operated as single allotments, small holdings, and small farms. The various lines of work carried on by the tenants are also described.

"The holdings are successful, judging by the state of the cultivation of the land, the number of stock kept, the extremely rare changes of tenancy, and the prompt payment of rent. Upon 4,000 acres of land, let to 70 resident small holders and to upward of 300 nonresident small holders and allotment holders, the only arrear of rent is 33s., the rent of an acre allotment. During the past 12 years the lost rent has amounted to less than 2s. 6d. for each £100 payable." The lack of adequate capital is said to be the great drawback to the cultivation of small holdings.

Agricultural holdings (Scotland) bill (*London, 1908, pp. II+23*).—The text of the law of 1908 regulating the relations between farm tenants and landlords in Scotland is reported.

Mutual insurance for farmers, C. F. MINGENBACK (*Biennial Rpt. Kans. Bd. Agr., 16 (1907–8), pp. 678–687*).—A paper read before the thirty-seventh annual meeting of the Kansas State Board of Agriculture setting forth the estimated number of mutual insurance societies among farmers in the United States, the advantages of the system, and the rates and amounts of insurance in effect. Kansas in 1906 had 18 farmers' mutual societies insuring against fire, lightning, and windstorm, while the total number in the United States was estimated at 2,250.

The paper is followed by a discussion.

Grange banks are successful, W. F. HILL (*Orange Judd Farmer, 46 (1909), No. 18, p. 695*).—Notes are given on the operation of farmers' banks in Pennsylvania, of which 20 and one trust company have been organized in three years.

A large cooperative creamery, M. BEAU (*Jour. Agr. Prat., n. ser., 17 (1909), No. 10, pp. 299–302, figs. 2; Indus. Latt. e Zootec., 7 (1909), No. 7, pp. 113, 114*).—This article describes the organization and operation of the cooperative dairy of Vienna, Austria, confined largely to the distribution of fresh milk and cream, which is said to be the largest and best equipped organization of its kind in the world.

Law of February 26, 1909, authorizing loans to agricultural cooperative societies in Algeria (*Jour. Agr. Prat., n. ser., 17 (1909), No. 9, pp. 277, 278*).—The text of the law is reported.

Agricultural bookkeeping, H. SCHMIDT and P. WALTER (*Landwirtschaftliche Buchführung. Hanover, 1908, pp. VI+59*).—A single entry system of bookkeeping for farmers is described and illustrated.

The pensioning of farm laborers, S. FERRARI (*Bul. Agr. [Milan], 43 (1909), Nos. 16, pp. 1, 2; 17, p. 2*).—This article discusses the forms of mutual assurance for pensioning aged or injured farm laborers practiced by certain agricultural associations in France, and the author proposes a detailed plan for organizing such associations in Italy, which is believed to offer a partial solution of the problem of retaining farm laborers on the land.

The effects of the periodical movement of laborers in Italy and the attempt at government regulation, T. MUELLER (*Ztschr. Agrarpolitik, 7 (1909), No. 3, pp. 99–117*).—This article describes the custom which prevails among large numbers of farm laborers in Italy of traveling from place to place in search of employment.

Statistics are presented of the number and classes of laborers seeking employment during each month of the year, and the kinds of work at which employed during the seasons. The causes and effects of the movement are pointed out. Among the results mentioned are an oversupply of farm labor in some districts and a scarcity in others, the former frequently resulting in strikes, reduction in wages, and conflicts between the incoming and native laborers. The seriousness and frequency of these tendencies in recent years have led to the organization of government information and arbitration commissions for the purpose of controlling the annual movement of farm laborers, and the economic and social advantages of these efforts on the part of the government are discussed.

Measures against contract-breaking agricultural laborers, SCHADE ET AL. (*Sächs. Landw. Ztschr., 56 (1908), No. 49, pp. 1336–1348*).—The regulations and penalties in force in certain parts of Germany relating to the breaking of contracts between farmers and farm laborers are presented and discussed.

The development of the agricultural industry in Germany as a result of the scarcity of farm labor, F. BORNEMANN (*Fühling's Landw. Ztg., 58 (1909), Nos. 3, pp. 92–108; 4, pp. 121–146*).—The author reviews the history of German agriculture during the past 50 years, and discusses the cause and extent of rural depopulation, the substitution of foreign for native laborers, the efforts made to retain the people on the land, the combination of agriculture with some industry in order to give constant employment to farm laborers, the changes in farm management to save labor, the changes in number and size of farm holdings, the use of implements and machinery, and the technical operation of farms to save hand labor. He presents a comparison of agricultural conditions in England and the United States with German conditions, and a general forecast of what the future development of agriculture is likely to be in Germany.

Two agrarian problems, J. KOŽANÝ (*Wiener Landw. Ztg., 59 (1909), Nos. 23, pp. 235, 236; 24, pp. 248, 249*).—The author discusses the factors which

affect the prices of agricultural products and the increasing indebtedness of landowners in Austria.

As to the former problem he shows that the farmer has little or nothing to say about the price of his products and that this has had considerable to do with increasing his indebtedness which has more than doubled since 1868. The indebtedness of landowners is now one of the most serious of national problems, and, in the author's opinion, has no solution other than through an increase in the profitableness of agriculture.

The agricultural development of Bulgaria, C. WLACHOFF (*Die landwirtschaftliche Entwicklung Bulgariens. Inaug. Diss., Univ. Erlangen, 1907, pp. X+81*).—An inaugural dissertation dealing with the economic development of agriculture from 1878 to 1903.

Yearbook of rural economy, 1909, H. C. LARSEN (*Landökonom. Aarbog [Copenhagen], 10 (1909), pp. 130*).—This is the annual directory of public institutions and associations for the advancement of Danish agriculture in its various branches.

The present position of Danish agricultural products on the English market, H. FABER (*Tidsskr. Landökonomi, 1909, No. 2, pp. 88–113, figs. 2, dgms. 4*).—An address dealing with statistics of the Danish and other agricultural products on the English market and with questions regarding the trade in Danish butter and bacon in Great Britain in the future.

The harvest in Norway, 1908 (*Ber. Hösten Norge, 1908, pp. 76*).—The report of the secretary of agriculture of Norway for 1908.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 5, pp. 29–92*).—Statistics on the condition, value, yields, and prices of principal crops in the United States, notes on European crop conditions, and a list of recent bulletins issued by the Bureau of Statistics are given in this number.

AGRICULTURAL EDUCATION.

The problem of rural schools and teachers in North America. EDITH H. SPALDING (*Bd. Ed. [London], Ed. Pamphlet 13, pp. 70*).—This is a description from an English view point of the workings of those American school agencies which have been progressively developed in the attempt to solve the problem of rural education. It shows clearly how the problem itself arose from a condition of diminishing rural population as the trend to the cities increased, and reviews the various efforts made to counteract this tendency. The influence of utilitarianism and of sociological interest in educational reform is noticed, and the accomplishments of the Patrons of Husbandry, farmers' institutes, the nature-study movement, and special teachers' colleges are carefully estimated. Special attention is given to the subject of school consolidation in Canada under the provisions of the Macdonald Fund administered by Prof. J. W. Robertson, late commissioner of agriculture at Ottawa. An important chapter is devoted to the training of teachers for the new requirements of country life education, and the work of the newly-founded Macdonald College is emphasized as affording to city as well as rural teachers the stimulus of a unique training in purely agricultural surroundings. Ten appendixes include statistics, regulations, plans of buildings and grounds, courses of study, and other matters referred to in the report.

Agriculture in the high schools of Michigan, W. H. FRENCH (*Mich. Agr. Col., Dept. Agr. Ed. Bul. 2, pp. 12, figs. 5*).—This bulletin relates some of the facts learned in nearly a year's observation of secondary agricultural instruction given in the North Adams (Mich.) High School, which was instituted under the direction of the chair of agriculture at the Michigan College.

In a school poulation of 121 there is an attendance of 42 nonresident students. Forty of the 43 high school boys are now studying agriculture, and 4 of these had previously graduated or had left the high school.

The agricultural course is arranged as follows: Ninth grade—general and agricultural botany, a half year each; tenth grade—horticulture and field crops, half year each; eleventh grade—live stock, dairying, and poultry, entire year; twelfth grade—soils, one-half year, and farm management and farm mechanics, half year. In response to a strong demand from the surrounding country the school also gave a farmers' short course of one evening lecture each week for 10 weeks, to an average attendance of 25.

Some conclusions drawn from the year's observations are that the practical applications of the agricultural instruction have greatly increased the interest in the high school and have "steadied" the work of the entire school; that agricultural instruction gives point and value to all other high-school work in science, arithmetic, and language; that it can be successfully given under ordinary high school conditions, and that it has furnished at least as much training in thought and judgment as any of the traditional studies in the curriculum.

Report of the Royal Agricultural Academy of Sweden, 1908, H. JUHLIN-DANNFELT (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 3, pp. 111–157*).—An account of the work of the Academy and its various departments during 1908.

Instruction in forestry in Sweden (*Yttranden i Anledning af Betankände. Stockholm, 1909, pp. 160*).—This is the report of a committee of experts selected by the Agricultural Department of Sweden to consider and report upon the best arrangement of forestry instruction in that country.

Agriculture for teachers, C. SELTENSPERGER (*Le Livre Agricole des Instituteurs. Paris, 1907, pp. XI+480, figs. 177*).—This is a text-book of agriculture for the use of teachers in normal schools, high schools, and colleges, and attempts to set forth in methodical order the facts of current agricultural practice and the reasons for them. It consists of 5 main divisions: (1) General agriculture, dealing chiefly with the soil, drainage, irrigation, fertilizers, etc.; (2) special crops, their diseases and the remedies to be applied; (3) vine culture, the choice of stocks, propagation, pruning, cultivation, fertilization, and the making of wine; (4) live stock, including the principles of feeding and improvement of domestic animals and their products; and (5) rural economy and legislation, with a discussion of the organization and value of agricultural societies and of systematic farm accounting.

Catechism of agriculture, T. C. ATKESON and D. W. WORKING (*Morgantown, W. Va., [1909], pp. 24*).—This little pamphlet contains a concise series of questions and answers classified under the heads of scope of the subject of agriculture, soil management, plant management, and animal management. It is stated that care has been used "to make every question suggestive and every answer accurate and intelligible."

Elementary agriculture, F. PERALTA (*San Jose, Costa Rica, 1909, pp. 226+VI, figs. 45*).—An elementary text-book of agriculture comprising 605 questions and answers on the study of plants, soils, and fertilizers. An appendix includes 32 simple experiments demonstrating some of the lessons, and tables giving the chemical composition of different materials and of fertilizers.

Text-book of Egyptian agriculture, edited by G. P. FOADEN and F. FLETCHER (*Cairo: Govt., 1908, vol. 1, pp. 320, figs. 63*).—This is the first of a two-volume series to be issued by the Egyptian ministry of education, intended primarily for the use of students but dealing quite fully with the general conditions of agri-

cultural practice in tropical countries. Three chapters are contributed by A. Linton on atmosphere and climate in relation to agriculture, the soil and its properties, and the cultivation of the soil. R. Lang-Anderson has three chapters on irrigation and drainage implements, and land reclamation. The remaining two chapters discuss cultivating and harvesting implements and manures.

Economical farm and dairy management, A. Ducloux (*Économie Ménagère Agricole et Laitcrie. Paris, 1908, pp. 532, figs. 182*).—This volume is designed especially for the use of students in traveling schools of agriculture and dairying. It contains five treatises on agricultural topics. The first, which has to do with domestic economy, particularly for farmers' families, discusses the selection and furnishing of homes, food and diet, the preservation of fruits, and similar questions. The second part has to do with dairying and pork raising, and the third with milk, butter, and cheese. The fourth deals with poultry raising, and the fifth with gardening.

The physical properties of soils, A. C. McCall (*New York and London, 1909, pp. VIII+102, pls. 3, figs. 32*).—A laboratory manual for the use of students in soil physics. It covers the range of experiments usually taught in such courses and includes rules for the use of the chromic-acid method of determining organic matter in a soil, and directions for standardizing the eyepiece micrometer used in the mechanical analysis of soils.

Farm arithmetic, Jessie Field (*Shenandoah, Iowa, 1909, pp. 29*).—In this little manual about 125 agricultural problems, intended to supplement the textbook in arithmetic for pupils in the seventh and eighth grades, are grouped according to subject-matter, some dealing with the farm inventory, others with farm crops, rotations, the dairy, poultry, birds, weeds, insects, farm buildings, farm labor, and drainage.

Seed testing, F. W. Taylor (*N. H. Col. School Bul. 4, pp. 63–76, figs. 39*).—Methods of testing seeds for purity and viability and the apparatus needed for these tests are described. Five exercises in testing seeds are outlined.

Culture and marketing of tobacco, J. E. Davis (*Hampton Leaflets, n. ser., 5 (1909), No. 4, pp. 8, figs. 5*).—Information concerning the growing, curing, and marketing of tobacco is given in sufficient detail to be of special value to teachers of geography and agriculture.

Plant breeding, G. F. Freeman (*Agr. Ed. [Kans. Agr. Col.], Farmers' Inst. Ser., 1 (1909), No. 2, pp. 92, figs. 21*).—A prefatory note to this number indicates as the general purpose of the series the stimulating of Kansas young people to a perception of the fact that successful farming is an intellectual occupation. The present number takes up in succession the topics of fruit improvement, including grapes, apples, pears, plums, and the small fruits, and cereal breeding, including corn, wheat, and miscellaneous crops. It also includes a reprint of an article by the same author on the Scientific Principles of Plant Breeding. The historical development of the subject is adequately treated, and directions for its practical application on the farm are clearly given.

An elementary study of insects, T. J. Headlee (*Agr. Ed. [Kans. Agr. Col.], Teachers' and Pupils' Scr., 1 (1909), No. 3, pp. 52, figs. 47*).—This number contains an illustrated description of the structure of insects, directions for collecting and mounting specimens, and a detailed life history of the Hessian fly, chinch bug, codling moth, clothes moth, and honeybee, with methods of combating those which are injurious.

Insects injurious to farm crops, G. A. Dean (*Agr. Ed. [Kans. Agr. Col.], Farmers' Inst. Ser., 1 (1909), No. 4, pp. 91, figs. 85*).—This number is devoted to a study of insects and small animals injurious to farm crops and is fully illustrated. It is introduced by a prefatory note advising that some member

in each farm family should become a practical entomologist by personal study and cooperation with the State experiment station.

MISCELLANEOUS.

Nineteenth Annual Report of Arizona Station, 1908 (*Arizona Sta. Rpt. 1908, pp. 323–382*).—This contains the organization list, an administrative report by the director on the work of the station as a whole, a financial statement for the fiscal year ended June 30, 1908, seven departmental reports noted elsewhere in this issue, and an article on The Weather for 1908 noted on page 15.

Twenty-first Annual Report of Georgia Station, 1908 (*Georgia Sta. Rpt. 1908, pp. 245–255*).—This contains the organization list, reports by the president of the board of directors and by the director of the station on its work during the year, and a financial statement for the fiscal year ended June 30, 1908.

Nineteenth Annual Report of New Mexico Station, 1908 (*New Mexico Sta. Rpt. 1908, pp. 58*).—This contains the organization list, a report of the director on the work, publications, and exchanges of the station, departmental reports on the various lines of station work conducted during the year, and a financial statement for the fiscal year ended June 30, 1908. The report of the chemist is abstracted on pp. 18, 22, and 72 of this issue.

Annual Report of South Dakota Station, 1908 (*South Dakota Sta. Rpt. 1908, pp. 20*).—This contains the organization list, a report by the director on the personnel, lines of work, publications and exchanges of the station, a financial statement for the fiscal year ended June 30, 1908, and brief reports from heads of departments.

Eighteenth Annual Report of Wyoming Station, 1908 (*Wyoming Sta. Rpt. 1908, pp. 94*).—This contains the organization list, a report of the director on the work and publications of the station during the year, a financial statement for the fiscal year ended June 30, 1908, and reports of the chemist, botanist, agronomist, wool specialist, irrigation engineer, librarian and meteorologist. The experimental work is for the most part abstracted elsewhere in this issue. Soil moisture determinations for samples collected weekly from a field of brewing barley are also included.

Experiment Station Work, L (*U. S. Dept. Agr., Farmers' Bul. 353, pp. 32, figs. 14*).—This number contains articles on the following subjects: Commercial clover seed, dodder in alfalfa seed, growing potatoes under straw, hens *v.* incubators, preparing fowls for market, preservation of eggs, the mound-building prairie ant, coagulation of milk in cheese making, effect of alkali on cement structures, silo construction, a cheap and efficient sterilizer, a cheap and efficient ice box, and the power laundry for the farm.

Report of the agricultural department of Finland, 1906 (*Landtbr. Styr. Meddel., 1908, No. 60, pp. 212*).—The report describes the various activities of the department for the advancement of Finnish agriculture, through the schools of agriculture, dairying, forestry, horticulture, and domestic science, and through the work of agricultural experts, societies, and chemical and seed control stations.

NOTES.

Alabama College.—Charles S. Ridgway, of the Johns Hopkins University, has been appointed instructor in botany.

Alaska Stations.—At Kodiak Island, Laurence Kelly has been appointed assistant dairyman and J. W. McCausland general assistant. Herman G. Zoellner has been appointed gardener at Sitka.

Arkansas University and Station.—The agricultural work of the university and station has been reorganized into ten departments as follows: Entomology, horticulture, dairy husbandry, veterinary science, agricultural education, agricultural chemistry, agronomy, plant pathology, animal husbandry and farmers' institutes. Dr. C. F. Adams, acting dean of the college of agriculture and director of the station, has been appointed dean and director. J. L. Hewitt has been promoted to the chair of plant pathology, and A. K. Short to that of animal husbandry and animal husbandman in the station. Additional assistants have been appointed including Paul Hayhurst, entomology; R. A. Gow, veterinary science; J. R. Tucker, agricultural chemistry; J. M. Wilson, agricultural education; M. B. Oates, animal husbandry; and Ashley P. Boles, plant pathology.

California University.—The Superior Court at Fresno has granted the petition of the university for a partial distribution of the estate of the late M. Theodore Kearney. It is expected that this will terminate the protracted litigation, and that the institution will thereby come into possession of property valued at over one million dollars, the income of which is to be applied to agricultural instruction and research in the San Joaquin Valley.

A short course in horticulture was held at Davis, April 26 to May 20, at which a special feature was a preparatory course for prospective horticultural commissioners and inspectors under the new State law. The course was preceded by a three-day conference at Berkeley of Pacific Slope entomologists, for the consideration of the special insect problems of the region. At this conference a permanent organization was effected under the name of Pacific Slope Association of Economic Entomologists, with C. W. Woodworth as president and W. B. Herms as secretary-treasurer. Active membership is to be restricted to official and professional entomologists of the Pacific Slope, while associate membership is to be open to farmers and others interested in the objects of the association. The next meeting is to be held during the summer at Portland, Oreg.

Recent appointments include W. T. Horne of the Cuban Station, as assistant professor of plant pathology, Dr. J. E. Coit of the Arizona Station, assistant professor of pomology, Charles B. Lipman instructor in soil bacteriology, R. M. Roberts instructor in farm practice, John D. Rose assistant in the cereal laboratory, L. Bonnet assistant in viticulture, and E. Chagnon viticultural chemist. Robert H. Loughridge has been made professor of agricultural chemistry emeritus, F. T. Bioletti associate professor of viticulture, E. B. Babcock assistant professor of agricultural education, H. J. Ramsey assistant professor of plant pathology, Roscoe Farrar instructor in soils and farm crops, and N. D. Ingham assistant in silviculture. Leroy Anderson, who has been in charge of the secondary school at Davis, is to direct its work from Berkeley, while E. W. Major and

Arthur M. Cleghorn are to reside at Davis, the former taking charge of the farm operations and the latter of the educational work.

The board of regents has set aside $200,000 from the general funds of the university for an agricultural building, on which it is expected to begin work this fall.

Connecticut College.—The *C. A. C. Lookout* reports an appropriation by the legislature of $18,000 for four new cottages, and $5,000 for the poultry plant.

Florida University and Station.—The board of control has been authorized to expend $80,000 for the erection of new buildings. Half of this amount will be used for the construction of a biological building and the remainder for the erection and equipment of a new station building. The legislature has appropriated $15,000 for farmers' institutes for the ensuing biennium, and has passed an act requiring the teaching of agriculture in all elementary schools of the State.

Stanley E. Collison has been appointed assistant chemist in the station, entering upon his duties July 1, and Owen F. Burger has accepted a position as assistant plant pathologist. E. P. Greene has resigned as assistant entomologist to accept a position as assistant State chemist. R. Y. Winters, assistant botanist, has been given a year's leave of absence to take up postgraduate work at Cornell University.

Guam Station.—John B. Thompson, for several years connected with the Bureau of Agriculture of the Philippine Islands, has been appointed special agent in charge, with H. L. V. Costenoble as assistant. Considerable material has been received for the erection of the station buildings. Experimental plantings of forage and other crops from seed secured from the mainland and Hawaii have been begun by the station, and seeds have also been distributed to farmers and others for trial.

Hawaii Federal Station.—David T. Fullaway has been promoted from assistant entomologist to entomologist. Valentine Holt has been appointed assistant agriculturist.

Idaho University and Station.—A law was passed by the last legislature dividing the State into two educational districts. In each of these a secondary agricultural school is to be established by the regents of the university and at their discretion a branch experiment station. The course of study for the schools is to have for its major function "vocational education in agriculture and in farm home making, not neglecting subjects of broadly educational value, and shall articulate such studies with agriculture and home economics courses of the State College of Agriculture above and the consolidated rural schools below." The work of the branch stations "shall be especially directed to the solution and demonstration of the agricultural problems of the respective districts in which the stations are respectively located."

Illinois Station.—The annual appropriations for soil investigations have been increased for the ensuing biennium from $25,000 to $60,000.

Iowa College and Station.—The new agricultural building was formally dedicated June 9, the ceremonies forming a part of the commencement exercises. The building is of the best modern type, of simple but substantial fireproof construction of granite and Bedford stone, and cost about $400,000. It is a four-story structure with a main portion 234 by 78 ft., and a semicircular wing of 90 ft. frontage, the wing containing an assembly room seating about 1,000. Most of the agricultural work of the college and station is to be located in the new building, including the departments of animal husbandry, soils, farm crops, horticulture, forestry, agricultural extension, agricultural chemistry, and agricultural journalism.

Breeder's Gazette announces the appropriation by the legislature of $10,000, which it is expected will be supplemented by private funds, for extension work in dairying under the direction of an executive committee composed of the officers of the State Dairy Association, the dean of the college, the professor of dairying, and the State dairy commissioner. Hugh G. Van Pelt, formerly in charge of the college dairy farm, has been given the general supervision of the work. A prize competition for the champion dairy animal in the State is in progress under the direction of the college. G. T. Guthrie has been appointed assistant professor of dairying, and F. L. Odell, of the Dairy Division of this Department, instructor.

Dr. Milliken Stalker, head of the department of veterinary science for many years, died at Ames, June 14. Dr. Stalker was born August 6, 1841, and was graduated from the college in 1873. Upon graduation he was appointed professor of agriculture and for a time gave all of the instruction in that subject, besides acting as farm superintendent and as secretary to the board of trustees. Later he took up the study of veterinary science, receiving the degree of V. S. at the Ontario Veterinary College in 1877, and returning to Ames to become professor of agriculture and veterinary science. In 1878 the agricultural work was separated, and Dr. Stalker became thereby the head of the first school of veterinary science in the West. Upon the establishment of the station he also became its veterinarian, continuing in these positions until 1900 when he retired from active work.

In the course of his long career Dr. Stalker was the instructor of a large number of men prominent in the veterinary profession. He was largely instrumental in securing the establishment in 1884 of the office of State veterinary surgeon, and organized this work, remaining at its head until 1895. His chief contributions to science were made as reports from that office.

Kansas College and Station.—A. L. Sponsler, of Hutchinson, has been appointed to the board of regents, vice W. J. Todd, resigned. Miss Lorena E. Clemons has resigned as secretary and has been succeeded by Miss Margaret Butterfield.

A recent hailstorm at the Fort Hays Substation did a large amount of damage to about 900 acres of farm crops. The cash loss is estimated at $6,000.

Louisiana Stations.—Recent appointments at Baton Rouge include Thomas C. Paulsen as animal pathologist, and S. W. Plauche as assistant chemist in the fertilizer and feedstuffs laboratory.

Maine Station.—O. A. Johannsen, Ph. D., has been appointed associate entomologist, and A. G. Durgin assistant chemist, the latter vice Miss J. C. Colcord, resigned.

Massachusetts College.—The legislature has granted an appropriation of $80,000 for the erection of a fireproof building for the departments of zoology and entomology. The department of zoology is conducting a ten-day camp at the mouth of the Poquonnock River, Groton, Conn., for introductory work in marine zoology, the course forming a supplement to the regular courses in general and economic zoology.

W. D. Hurd, dean and professor of agronomy at the University of Maine, has been appointed director of short courses. He will have charge of the entire short course work, including the winter courses and the summer school of agriculture. He will also undertake other work in cooperation with the State Board of Agriculture and the State Grange, this including lecturing and writing in a general campaign for rural progress in the State.

Montana College and Station.—Dr. Walter J. Taylor, a graduate of the New York State Veterinary College, has been appointed to take charge of the newly

established department of veterinary science, and will enter upon his duties September 1. O. B. Whipple, of the Colorado College and Station, has been appointed horticulturist, beginning work July 1. Whitfield Spain and Elwood Morris, graduates of this college, have been appointed to station positions, the former becoming assistant in agronomy in charge of agricultural engineering work, and the latter assistant biologist for work in botany.

Nevada University and Station.—Dr. C. A. Jacobson, of the Rockefeller Institute, has been appointed chemist.

Cornell University.—A portrait of the late Dr. George Chapman Caldwell was presented to the university, June 16, by his colleagues and former students. The presentation address was made by Hon. Andrew D. White.

North Dakota College.—A department of education has been established in accordance with the Nelson Amendment, with Arland D. Weeks as professor in charge. In addition to general courses in the history of education, psychology, adolescence, school observation, and administration, it provides a special course in agricultural and industrial education, supplemented with occasional lectures by specialists in these subjects. The new department conducts an industrial summer school for teachers this year, August 2-26. Instruction will be given in the regular public school subjects and also in elementary agriculture, manual training, nature study, domestic science, agricultural botany, and agricultural and industrial education. In addition to the class room instructiion many special lectures have been announced, among which are one by Dr. A. C. True, of this Office, on The Point of View and Atmosphere in the Rural Schools, one by Dean L. H. Bailey, of Cornell University, on The Outlook for Country Life, and seven by F. W. Howe, of this Office, on different phases of public-school agriculture and country-life problems.

Industrialist notes the appointment of Miss Jessie A. Hoover as professor of home economics.

Ohio University.—John F. Lyman, Ph. D. (Yale, 1909), formerly an assistant in the university, has been appointed assistant professor of agricultural chemistry and will begin his duties with the next academic year.

Porto Rico Station.—Recent appointments include C. F. Kinman, of the Cuban Station, as horticulturist, vice the late M. J. Iorns, and William C. Taylor as assistant chemist.

Rhode Island College.—*Industrialist* notes the appointment of Miss Helen B. Thompson as professor of home economics.

Clemson College.—Press reports announce the resignation of Dr. P. H. Mell, for the past seven years president of the college. Dr. C. H. Shattuck, associate professor of botany and forestry, has resigned to accept a professorship in the University of Idaho.

South Dakota College.—The legislature has appropriated $10,000 for an addition to the chemical laboratory and equipment therefor, and a like amount for the erection and equipment of a dairy barn.

Tennessee University.—The *Chattahooga News* of June 10 announces that the agricultural department of the university has offered free scholarships in the Summer School of the South, held at Knoxville, to four teachers in each county of the State who take the courses in elementary agriculture and horticulture, introduce this work in their own schools, and assist in getting it into the other schools of their county. These scholarships are worth $10 each, and appointments to them are made by the various county superintendents. They admit appointees not only to the courses in agriculture and horticulture (four hours per day) but also to any of two hundred or more other classes for which the teachers have time.

Vermont University.—Miss Bertha M. Terrill has been appointed to the newly established professorship of home economics.

Virginia Truck Station.—A series of farmers' institutes, emphasizing especially the truck crop work of the station, was held along the Rappahannock River, June 4 and 5, the station cooperating with the State commissioner of agriculture. A steamboat had been put at the disposal of the institute officials, and this made 8 stops of about one and one-half hours each along the way. The attendance varied from 75 to 150 and the meetings seemed to be much appreciated.

Wisconsin University.—The legislature has appropriated $50,000 for the general extension work of the university for the ensuing year, and $75,000 for the year following. In addition $30,000 annually was granted for agricultural extension work and $20,000 for farmers' institutes. Principal K. L. Hatch, of the Winnebago County Agricultural High School, has been appointed extension secretary.

H. C. Taylor has been promoted to the professorship of agricultural economics, E. G. Hastings to the associate professorship of bacteriology, and E. R. Jones and C. P. Norgord to the assistant professorships of soils and agronomy respectively.

Agriculture in Minnesota High Schools.—The legislature of Minnesota has passed an act providing State aid for 10 high schools or consolidated rural schools which maintain agricultural and industrial departments. The State will pay two-thirds of the expense to maintain these departments provided that each school employs trained instructors in agriculture, manual training, and domestic science, possesses not less than 5 acres of land suitable for school gardens and experimental and demonstration purposes, and that the total expenditure for each school does not exceed $2,500.

The 10 schools selected are the high schools at Albert Lea, Alexandria, Canby, Glencoe, Hinckley, Red Wing, and Wells, the high schools and associated rural schools at Cokato and McIntosh, and the consolidated school at Lewiston. The act also provides that not to exceed 10 schools may be added to the list during each succeeding biennium.

Agricultural Instruction in Porto Rico.—An act of the legislative assembly of Porto Rico, approved March 11, 1909, appropriates $3,000 "to assist the Agricultural Institute of Arts and Trades at Lajas in its work of affording an education to students of agriculture and other subjects studied in the same," provided the department of education organizes and supervises instruction in the subjects included in the common-school course. This instruction is to be free to students regularly enrolled in the institute and also to other children residing in the vicinity who may be legally enrolled in the public schools of Porto Rico. Of the appropriation $2,000 is to be expended for improvements in the shops and for agricultural implements, and $1,000 for the maintenance of poor children dwelling in the buildings of the institute.

Agricultural Division of Oklahoma State Department of Education.—The *Oklahoma School Herald* announces that the Oklahoma State Department of Education has established an agricultural division for the assistance of public school teachers in agriculture, domestic science, and manual training. It plans first to promote the organization of boys' and girls' home culture clubs.

School of Household Arts, Columbia University.—A new School of Household Arts, Teachers' College, Columbia University, will be opened in September, with 40 instructors and 125 courses. These will include diploma and degree courses in preparation for teaching domestic art, domestic science, supervising domestic art and science, and hospital economy; certificate courses in preparation for technical callings—household and institution administration, dietetics, house

decoration, and preparatory courses for nurses, and technical training in costume design, management of institutional laundries, social work, and other specific fields; and special practical courses for part-time students in household management, home nursing, care of children, elementary and advanced cookery for household use, costume design, house sanitation, etc.

The new building of the school adjoins the main building of the college on the east, is 160 feet long and 60 feet deep, consists of 5 floors, a basement, and a tower of 2 additional stories rising 120 feet from the street level, and will accommodate 400 students.

Summer School for Teachers.—The first session of the Oberlin Summer School of Methods is being held in Oberlin, Ohio, during the 6 weeks ending August 6. Instruction will be offered in various subjects of interest to elementary and high school teachers, including manual training, agriculture, forestry, agricultural education, domestic science and art, nature study, and human physiology and hygiene.

Summer Course in Agriculture for Manitoba Teachers.—The law of Manitoba now requires that every teacher in the province taking normal work shall take the teachers' course at the Agricultural College before receiving a certificate. Three successive classes are taking the 2 weeks' course this summer.

The work includes field husbandry—importance of field crops in western Canada, insect economy, grain judging, and identifying foul-weed seeds; animal husbandry—lectures on the relation of live stock to modern agriculture, principles of feeding, development and characteristics of the more important breeds of live stock, together with practical demonstrations in the judging pavilion; dairying—milk testing, composition of milk, and its products, principles of cream separation, churning, etc.; horticulture, forestry, and botany; and some work in mechanics.

Nova Scotia Agricultural College.—The fourth annual report of the principal of the Nova Scotia Agricultural College, Truro, shows that the attendance in the regular 2-year course has increased from 23 in 1905–6 to 48 in 1908–9, and the attendance in the short course from 40 in 1904 to 221 in 1909. The attendance in the rural school of science, July-August, 1908, was 30.

This summer school, especially suited for teachers, was conducted by the college and normal school staffs. The course is so arranged that the work can be completed in 3 summer vacations, or if students have had considerable science training, in 2 or even a single session. Teachers completing this course and receiving the rural science diploma receive an extra grant from the government of Nova Scotia.

At the women's short course in January, 1909, there were regularly enrolled 18 students, and in some classes 30. Instruction was given in horticulture, dairying, seed selection, poultry raising, domestic science, and judging horses and cattle. For the first time in the history of the Maritime Provinces agricultural students have issued a paper dealing with matters relating to the agricultural college and the general interests of the eastern farmer. This magazine, the first number of which was issued in January, 1909, is known as *The Maritime Students' Agriculturist.*

Forestry Education in New Brunswick.—As an outcome of the Provincial Forestry Convention held in Fredericton in February, 1907, a grant of $2,500 was made for the establishment of a department of forestry in the University of New Brunswick, Fredericton. The course now offered covers 4 years, leading to a bachelor's degree, and runs parallel with the engineering course, with the addition of botany in the freshman and forest botany in the sophomore years. There are 13 men in all classes.

Rural Education in England.—At the request of the Central Land Association, the Central Chamber of Agriculture, and the Farmers' Club, an important conference of the County Councils' Association was held at Caxton Hall, Westminster, on March 31, for the discussion of rural education in its various grades.

A resolution to the effect "that local education authorities should aim at securing better instruction in rural subjects, and that the teaching should be adapted to the circumstances of country life; school gardens and equipment for manual instruction should be provided, and elementary school teachers should be specially trained for their work," was referred to a special committee. It was pointed out that while it is nearly 40 years since elementary education was taken over by the Government, it is only in recent years that the education of the country child has begun to be related to his environment.

The conference urged that the more promising children be sent to secondary schools to receive instruction in nature study and elementary science in close connection with practical work in the workshop and garden, and suggested further that (1) the elementary and secondary schools remain under the board of education, but the more special agricultural education should be dealt with by the board of agriculture, and that (2) each group of counties be connected with some agricultural college which should educate students sent to it and also give lectures and other instruction to farmers who can not attend college, as is being done in some counties.

Nature Study and Elementary School Agriculture.—The *Nature-Study Review* for April presents a symposium on nature study and elementary school agriculture by D. J. Crosby, specialist of this Office in agricultural education, F. L. Stevens, of the North Carolina College and Station, C. H. Robison of the New Jersey State Normal School at Montclair, and Dean Davenport of Illinois. To these papers is added part of an address by Dr. A. S. Draper, State commissioner of education of New York, on the same topic.

The general trend of these discussions favors the large use of agricultural material for all rural nature-study work. Dean Davenport describes such work as "nature study plus utility;" but Dr. Draper holds that "the education of the rural child is not to be narrowed down to things rural," and that elementary work must have a universal interest.

Iowa Vacation Farm School.—The *Journal of Education* for April 8 contains an illustrated reference to the plan of a vacation farm school which is being developed by Principal P. J. Horchem, of the Audubon School, Dubuque, Iowa. This plan aims to provide useful educational employment for town school boys during the summer vacation, and its projector hopes ultimately to develop it into a new system of public education based upon agricultural work as the central factor.

Home Education.—Announcements have been sent out for the Third International Congress for Home Education, to be held at Brussels, Belgium, in 1910. The congress will consist of five sections: (1) The study of childhood, (2) the education of children, (3) abnormal children, (4) various subjects relating to childhood, and (5) publications. The secretary of the congress is Mr. L. Pien, 44 Rubens street, Brussels.

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EXPERIMENT STATION RECORD.

VOL. XXI. AUGUST, 1909. No. 2.

The programme of the recent convention of the National Education Association at Denver was remarkable for the attention given to industrial education. Nearly one-half of all the papers, addresses, and reports presented at the convention dealt in some direct way with one or more phases of industrial education. So decidedly did this subject dominate all others in the papers and discussions of the general sessions and the different department meetings that it shows clearly the almost universal demand for the reorganization of public school curricula along lines giving greater emphasis to local industrial and domestic affairs—agriculture, manual arts, and home economics. It might almost be said that the desirability of introducing such work as rapidly as possible into the regular work of the public schools was taken for granted, and that the problems troubling those who attended the Denver convention related to methods, administration and the training of teachers.

There was also considerable discussion on the purpose and value of industrial teaching. The purpose, it was quite generally agreed, is not so much to uplift agriculture or manufacturing or business, as it is to raise the level and increase the efficiency and happiness of those engaged in these pursuits. This was brought out by L. D. Harvey in his presidential address, in which he maintained that industrial education is much more than education for skill in industrial processes. "Industrial education," he said, "has for its purpose the acquiring of a body of usable knowledge of greater or less extent related to industrial conditions, processes, organization, and to the administration of industrial affairs, involving the gaining of some skill in the use of such knowledge and the securing of mental, æsthetic and ethical training through the acquisition and use of the knowledge indicated."

This interpretation of the purpose of industrial education was also adopted by James W. Robertson, president of Macdonald College, in his address on "Education for the Improvement of Rural Conditions." He maintained that the purpose of education in rural schools is not primarily to make a bigger steer or a bigger ear of corn, but "to make a better home for a better child." "The whole idea of education," in his opinion, "is to make the earth an ideal home for the race," and this will not be accomplished by training for

culture, the kind of culture popularly defined by the words "leisure, indolence, idleness," but through the refining influence of labor, labor which gives the boy a thrill as he looks upon his work, sees that it is well done, and realizes that he has done it. To realize such an ideal in education, Dr. Robertson believes that we must shift the emphasis from the "three R's," from letters to training for life in the locality.

The problem of relating the country schools more closely to the life and needs of the people was discussed more at length in the department of rural and agricultural education, especially in a round-table conference which was attended by Dr. Robertson and other leading educators who have identified themselves with rural school interests. This problem, as stated by D. J. Crosby, leader of this conference, involves both a fuller scheme of education and a new kind of education adapted to the real needs of the farming people.

"Such a scheme of public education," in his opinion, "calls for larger school units, to the end that the per capita cost of education may not be unduly increased when we provide better material equipment, better trained and better paid teachers, and higher grades of instruction within daily reach of the homes of all rural children. It calls for instruction in the principles and practice of agriculture and home economics in the rural public schools, and for the establishment of a limited number of new special schools of agriculture and home economics. It demands a new point of view in teaching the subjects now generally included in the public school curriculum, to the end that nonessentials shall be eliminated and greater concreteness and effectiveness shall be acquired through problems and illustrations drawn from the farm, the home, and the common things in the natural environment of the children. And, finally, it must have the united support of National, State, and county educational agencies, the bureaus and departments of education, the departments of agriculture, the State universities and colleges of agriculture, the State normal schools and the various associations of farmers and teachers, to study the pedagogical and practical problems involved in the redirection of country life education. That the problems are vast and complex no one will deny, that they are worth the best efforts of our most profound students of education is equally beyond question of doubt."

It was along these lines mainly that the discussions proceeded both in the conference and in the other two sessions held by the department of rural and agricultural education, and there was practical agreement between the details of the different papers and discussions and the essential factors of the summarized statement made by the leader of the conference.

Dr. S. A. Knapp, of this Department, gave a splendid discussion of the rural education problem as it appeared to him in the South, and dwelt especially upon the effectiveness of boys' clubs and the importance of teaching the young the value and importance of the garden, the poultry flock, and the cow, and how to care for them and realize the most from them. Valuable suggestions concerning the making of a high school course in agriculture, and the correlation of agriculture with other high school science, were made by Josiah Main of the University of Tennessee, and suggestions for the elementary course by R. O. Johnson of the State Normal School at Chico, Cal. There were also interesting papers on awakening and maintaining interest in agriculture, the present status of agricultural education in the public schools and National aid in the preparation of teachers of agriculture for the public schools.

Another matter which was discussed pro and con at this convention related to the establishment of special agricultural schools, but the different papers were presented at such widely different times and places as to render it difficult to get at the consensus of opinion. The matter came up first in the department of manual training where the question of establishing separate trade schools was under discussion, and President Kerr, of the Oregon Agricultural College, argued against separate trade schools for agriculture. Later, in the department of secondary education, Dean Davenport, of the University of Illinois, read a paper in which he presented arguments against the establishment of special agricultural high schools, on the ground that instruction in agriculture should be given in the public high schools, that courses in special schools must of necessity be narrow, and that the tendency of such schools would be to "peasantize" the farmers as agricultural schools had done in Germany.

There was no opportunity at that time for the discussion of Dean Davenport's paper, but on the following day, in the department of rural and agricultural education, some of his leading arguments were discussed by those who believe in the establishment of agricultural high schools. Briefly, the points brought out were to the effect that while there is general agreement that agriculture should be taught in all public high schools attended by rural pupils, there is also a pressing demand and need for a limited number of special agricultural schools for the accommodation of boys who have definitely made up their minds that they want to follow the business of farming; and that while it is true that some of the work in such schools must of necessity be narrower than in the public schools, the instruction in agriculture gains greatly in breadth and thoroughness as well as in the superior laboratory equipment, animals, machinery, and other facilities needed in the teaching of agriculture. There is also abundant opportunity in such schools to provide for

short special courses to meet the needs of the boy of limited time and means.

Dean Davenport's arguments that such schools would peasantize farmers was answered by showing that the farmers in Germany, to whom he referred, were peasants long before the establishment of agricultural schools in that country, and that they were peasants not because of the establishment of agricultural schools, but in spite of the uplifting influence of such schools. It was also pointed out that there is a difference between the influence of a school which pupils are compelled to attend and those which they attend from choice. In this country the greatest freedom of choice is given in the selection of courses by pupils attending city schools; there should be similar freedom for the country boy. The influence of the special agricultural school which the country boy may attend or not as he may choose, must inevitably tend toward the uplift of those who profit by its instruction and subsequently engage in the business of farming.

The reorganization of the departments of the National Education Association and their reduction to less than half the former number, was undoubtedly a wise measure. New departments had been added one at a time, to meet the demands created by new conditions in our public schools but without much reference to their relations to existing departments, until there were so many departmental meetings and so many conflicts in their programmes as to make it extremely difficult for a member of the association to follow the discussions on even one line of educational thought or endeavor. Under the new arrangement there are departments representing the different grades of schools, the administrative affairs of education, and groups of related subjects. Thus practically all general matters relating to the elementary schools will be considered in the department of elementary education instead of in two departments (kindergarten and elementary education) as formerly. This is largely true also of general matters relating to secondary education and higher education.

On the other hand ample provision is made in such departments as music education, professional training of teachers, and industrial education, for the consideration of important special phases of education. For example this grouping of special subjects brings together those interested in agricultural education, manual training, home economics, and technical instruction who formerly were much inconvenienced by conflicting programmes. This new arrangement ought to be highly satisfactory to all concerned. All of the subjects included in the new department of industrial education are closely related, and their consideration in one department where such relationship will have to be recognized will have a tendency to harmonize and correlate work which has thus far suffered from conflicts which were much more apparent than real.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY.

Technical methods of chemical analysis, edited by G. LUNGE ET AL., trans. and edited by C. A. KEANE ET AL. (*London, 1908, vol. 1, pts. 1, pp. XXIV+1–519, figs. 146; 2, pp. X+520–996, figs. 55*).—This is a translation of the latest German edition, adapted to English conditions of manufacture. The sections of the book of special interest from an agricultural standpoint are those relating to potassium salts, calcium compounds, drinking water and water supplies, sewage and effluents, soils, and air. The articles on the various subjects included in this book have been prepared by specialists in the different lines.

Colorimetric determination of phosphoric acid, I. POUGET and D. CHOUCHAK (*Ann. Chim. Analyt., 14 (1909), No. 4, pp. 125–129; Zhur. Opuitn. Agron. [Russ. Jour. Expt. Land.], 10 (1909), No. 2, pp. 129–134; abs. in Analyst, 34 (1909), No. 397, pp. 178, 179; Ztschr. Angew. Chem., 22 (1909), No. 16, p. 738*).—These are further references to accounts of a method already noted (E. S. R., 20, p. 703), which is based upon the turbidity produced when an alkaloid (strychnin) is added to a solution containing sodium molybdate, nitric acid, and phosphoric acid.

The colorimetric estimation of phosphates in solution with other salts, C. ESTES (*Jour. Amer. Chem. Soc., 31 (1909), No. 2, pp. 247–250; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 5, p. 261; Analyst, 34 (1909), No. 397, p. 179; Jour. Chem. Soc. [London], 96 (1909), No. 557, II, p. 266*).—Investigations of the influence of different salts upon the color obtained in the use of the ammonium molybdate colorimetric method showed that the error in reading does not exceed 5 per cent with a maximum of 5 parts of sodium sulphate, 10 parts of potassium nitrate or magnesium sulphate, 15 parts of potassium hydrogen sulphate, 20 parts of calcium nitrate, magnesium nitrate, or sodium chlorid, 30 parts of potassium ethyl sulphate, or 50 parts of sodium nitrate per 10,000 of the solution.

Gravimetric determination of phosphorus in cast iron and steel as ammonium phosphomolybdate, G. CHESNEAU (*Rev. Metal., 5, pp. 237–269; abs. in Chem. Abs., 3 (1909), No. 7, pp. 760, 761*).—A somewhat detailed study of the conditions affecting the accuracy of this method is reported, and the precautions to be observed in order to obtain precise results are described.

The determination of phosphoric acid by weighing the ammonium phosphomolybdate, H. PELLET (*Ann. Chim. Analyt., 14 (1909), No. 1, pp. 7–11; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 556, II, p. 182; Ztschr. Angew. Chem., 22 (1909), No. 22, p. 1026; Chem. Zentbl., 1909, I, No. 18, p. 1504*). This is a review of the article by Chesneau, noted above. The conditions affecting the accuracy of this method of determination as applied by Chesneau to iron and steel and by the author to soils, fertilizers, etc., are dis-

cussed. With the precautions prescribed the method is considered absolutely exact for the purposes proposed.

On the determination of sulphuric acid as barium sulphate. E. Ruppin (*Chem. Ztg., 33 (1909), No. 3, pp. 17, 18; abs. in Chem. Zentbl., 1909, I, No. 7, pp. 577, 578*).—The author points out that it is difficult to obtain accurate results in the precipitation of sulphuric acid by means of barium chlorid in the presence of large amounts of chlorids. As a result of a study of various methods, he concludes that accurate results can be obtained by precipitation in acid solution with a large excess of 10 per cent barium chlorid, the occluded barium chlorid being removed by repeated boiling.

The determination of sulphuric acid as barium sulphate. J. F. Sacher (*Chem. Ztg., 33 (1909), No. 25, pp. 218, 219; abs. in Ztschr. Angew. Chem., 22 (1909), No. 15, p. 685; Chem. Zentbl., 1909, I, No. 14, p. 1195*).—Referring to Ruppin's statement, noted above, that the precipitation of sulphuric acid in solutions containing a large amount of chlorids does not give exact results by ordinary methods, the author states that accurate results can be obtained by so controlling conditions as to secure slow precipitation in dilute solutions. He obtained best results when about 0.1 gm. of barium sulphate precipitate was obtained to each 100 cc. of solution.

The determination of sulphuric acid as barium sulphate. E. Ruppin (*Chem. Ztg., 33 (1909), No. 43–44, p. 398*).—Commenting upon Sacher's method of precipitation in very dilute solution, noted above, the author points out that under such conditions solubility of the barium sulphate plays an important rôle. His studies of the method indicate that a correction of 2.5 mg. per liter of solution should be used.

On methods of clay analysis. A. Atterberg (*K. Landtbr. Akad. Handl. och Tidskr., 47 (1908), No. 5–6, pp. 365–397, figs. 8*).—The methods of mechanical clay analysis proposed by earlier investigators are reviewed and the results of the author's studies bearing on classification of clays are given.

A method is tentatively recommended for the separation of clays into 6 natural groups, ranging from very stiff clays to sandy moor clays and so-called "mjun" clays. After a preliminary examination the dry pulverized sample is carefully examined under the microscope, and a "rubbing test" made of a cake of the clay that has been dried at 100° C. The mechanical analysis is preceded by boiling or shaking the sample with water if it is high in calcium carbonate and clay colloids but low in humus. If it is high in both calcium carbonate and humus, the latter is oxidized by digestion with sodium hypobromite solution (50 cc. bromin to 500 cc. of 20 per cent soda solution) in the cold for 24 hours. If the sample is low in or free from carbonates, or the fineness of the carbonates is not to be determined, the following method of procedure is adopted:

Twenty gm. of the sample is first treated with 100 cc. hydrochloric acid (sp. gr. 1.12) in a boiling water bath for an hour; the solution is made up to 508 cc. with distilled water (volume of soil sample 8 cc.), and then shaken and left to settle; the clear solution is decanted and the last portion filtered off ("hydrochloric-acid-solution A"). The residue is heated for 3 minutes with 20 cc. of a 20 per cent soda solution; then cooled and diluted to 508 cc., mixed, left to settle, and the clear solution decanted ("soda-solution B"). The residue is now elutriated in a graduated cylinder of special construction, and separated into coarse clay (0.02–0.002 mm.) and fine clay (less than 0.002 mm. in diameter), the quantities present of each portion being ascertained by weighing the dried residues. The hydrochloric-acid-soluble clay is determined in 50 cc. of solution A and 50 cc. of solution B by addition of a little nitric acid; diluting and heating in a covered beaker; ammonia is added gradually

from a pipette till the fumes have an alkaline reaction, and after boiling for a little longer it is left to settle and the precipitate transferred to a weighed filter, dried, and weighed.

Determinations are furthermore made of the humus content of the sample, calcium carbonate and sulphate, iron sulphid, sodium chlorid, and hygroscopic moisture.

According to the results obtained by this method of analysis, the clays are referred to one of the following classes: Very stiff clays—fine clay with more than 50 per cent hydrochloric-acid-soluble clay and less than 25 per cent coarser portions (silt, sand, and grit); stiffer medium clays—fine clay with 33 to 50 per cent hydrochloric-acid-soluble clay, 20 to 40 per cent coarser portions, and relatively low content of coarse clay; lighter medium clays—fine clay with 16 to 33 per cent hydrochloric-acid-soluble clay and 40 to 70 per cent coarser portions (silt mostly below 50 per cent); silty clays—fine clay with less than 16 per cent hydrochloric-acid-soluble clay and more than 50 per cent silt; sandy clays, with low content of fine clay and hydrochloric-acid-soluble clay and high content of sand (and grit) with high silt content; and "mjun" clays, with more than 50 per cent coarse clay (or coarse clay and fine silt content).

The colorimetric determination of nitrates in soil solutions containing organic matter, W. A. Syme (*North Carolina Sta. Rpt. 1908, pp. 64, 65*).—In the method proposed, potassium permanganate is added to the hot soil solution, containing a slight excess of sulphuric acid. The solution is filtered, made alkaline with sodium carbonate, and evaporated to dryness on water bath. The residue is treated with water, filtered, and diluted to its original volume, and nitrates determined in the usual way with phenoldisulphonic acid and ammonia.

Tests are reported which indicate that no nitrate was formed by the action of the permanganate on the organic matter.

The colorimetric determination of nitrates in soil solutions containing organic matter, W. A. Syme (*Jour. Indus. and Engin. Chem., 1 (1909), No. 3, pp. 188, 189; abs. in Science, n. ser., 29 (1909), No. 738, p. 307; Analyst, 34 (1909), No. 398, p. 241*).—Noted above from another source.

A new method for the determination of soil acidity, R. Albert (*Ztschr. Angew. Chem., 22 (1909), No. 12, pp. 533–537; abs. in Chem. Zentbl., 1909, I, No. 16, pp. 1350, 1351; Analyst, 34 (1909), No. 398, pp. 228, 229*).—In the method proposed the soil to be tested is suspended in water with a known amount of caustic alkaline earth (magnesia, lime, or baryta) and an excess of neutral ammonium salt (chlorid or sulphate), and the solution is boiled until all of the ammonia set free by the caustic alkaline earth is driven off. The ammonia is measured by collection in standard sulphuric acid and titration in the usual way. The difference between the amount of ammonia thus formed and that shown by direct action of the alkaline earth on the ammonium salt solution is taken as a means of calculating the amount of the base combining with the soil acids and thus affording a measure of the latter. For use with magnesia the author recommends ammonium sulphate, with lime and baryta ammonium chlorid. On the whole the baryta ammonium chlorid combination seems preferable to any other used. The method as a rule gives somewhat higher results than that of Tacke.

A study of the methods for the determination of iron and alumina in phosphate rock, W. C. Dumas (*Chem. Engin., 9 (1909), No. 4, pp. 107–113*).—A comparison of the more important methods which have been proposed for this purpose is reported, and the sources of error in the different methods are pointed out. The conclusion reached is that the Glaser alcohol method is the best for iron and aluminum in the hands of the inexperienced. It was found also that "a combination of the Glaser alcohol and acetate methods gives

excellent results and consumes no more time than either alone. The caustic alkali method for alumina is superior to the thiosulphate in point of accuracy in the hands of the inexperienced."

Methods for the determination of sulphurous acid and soot in air, HURDELBRINK (*Schr. Phys. Ökonom. Gesell. Königsb., 48 (1907), pp. 145–150, fig. 1*).—The construction and operation of an apparatus for this purpose, which consists essentially of an asbestos filter for the removal of the soot, an absorber containing iodin solution for the collection of the sulphurous acid, and a device for measuring the volume of air drawn through the apparatus, are described. The successful use of the apparatus in the examination of a number of samples of air is reported.

A rapid method for determining carbon dioxid in the atmosphere, S. H. DAVIES and B. G. MCLELLAN (*Jour. Soc. Chem. Indus., 28 (1909), No. 5, pp. 232–234*).—This is a modification of the minimetric method proposed by Angus Smith and perfected by Lunge and Zeckendorf, which is based upon the measurement of the air required to saturate the reagent used for the absorption of carbon dioxid. The principal modification consists of the substitution of a pump for the rubber bulb used in the original method, thus securing a more accurate measurement of the amount of air employed.

Polarimetric methods of estimating starch, E. EWERS (*Ztschr. Öffentl. Chem., 15 (1909), No. 1, pp. 8–14*).—A digest of data on the subject of estimating starch. The paper is followed by a discussion.

A polarimetric method of determining starch in barley, F. SCHUBERT (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 38 (1909), No. 1, pp. 17–31*).—Experiments conducted with a view to devising a polarimetric method for the determination of starch in barley are reported, and the results obtained by the author and other investigators are tabulated and discussed. A description of the necessary apparatus is also given.

Comparative experiments on the practical value of the precipitin reaction and the complement union method for identifying horse flesh, O. WEIDANZ and K. BORCHMANN (*Arb. K. Gsndhtsamt., 28 (1908), No. 3, pp. 477–497*).—From the experimental data reported the conclusion was reached that the biological method is the only satisfactory one for practical work along the line indicated.

Technique of the biological method for determining horse flesh, UHLENHUTH, WEIDANZ, and WEDEMANN (*Arb. K. Gsndhtsamt., 28 (1908), No. 3, pp. 449–476, figs. 8*).—A digest of data and an extended description of this laboratory method are given.

The identification of artificial coloring matter in sausage skins, T. MERL (*Pharm. Zentralhalle, 50 (1909), No. 11, pp. 215–217*).—An adaptation of the Polenski method for detecting artificial coloring matter is described which is suitable for use with small quantities.

Method of estimating essential oil in liqueurs, L. VANDAM (*Bul. Soc. Chim. Belg., 22 (1908), No. 7, pp. 295–300*).—A comparative study of the method which the author proposes.

The determination of essential oil and alcohol in flavoring extracts, J. HORTVET and R. M. WEST (*Jour. Indus. and Engin. Chem., 1 (1909), No. 2, pp. 84–95, figs. 2*).—An extended study of methods.

New state laboratories for suppressing frauds, G. A. LE ROY (*Separate from Bul. Soc. Indus. Rouen, 36 (1908), No. 1, pp. 98*).—Municipal laboratories are described, the text of the French pure-food law of 1905 is quoted, and official methods are given.

Practical guide for the analysis of milk, J. M. and P. PERRIN (*Guide Pratique pour l'Analyse du Lait. Paris, 1909, pp. VII+344, figs. 140*). This

book is intended as a laboratory handbook for pharmacists, physicians, chemists, milk analysts, and others who wish to have at hand brief descriptions of methods for the analysis of milk and milk products. The topics treated are as follows: Characteristics of milk; determination of milk constituents, including urea, cholesterin, lecithin, nuclein, and citric acid; determination of the freezing point and specific resistance of milk; modification of milk as influenced by heat, cold, electricity, disease, and other factors; detection of adulterations; microscopical and bacteriological examinations; milk from different animals; butter and cheese; preparation of reagents; and extracts from French laws relating to the sale and inspection of milk and milk products.

A new method for the rapid analysis of milk, A. Rolet (*Lait. et Indus. Ferme [Paris], 19 (1909), No. 4, pp. 25–27*).—The author describes the method proposed by Bordas and Touplain (E. S. R., 17, p. 335), and states that the time required for milk analysis is much shortened by this method.

Determination of proteins and formaldehyde in milk treated with formaldehyde, A. Agrestini (*Staz. Sper. Agr. Ital., 41 (1908), No. 8, pp. 520–529; abs. in Chem. Zentbl., 1908, II, No. 19, pp. 1640, 1641; Jour. Chem. Soc. [London], 96 (1909), No. 556, II, p. 194*).—A discussion of methods. The mercury process of Denigès is criticised. It is thought that a little 10 per cent solution of hydroxylamin hydrochlorid should be added to samples of milk containing formaldehyde before adding the mercury reagent.

A new method for the calculation of the proteins in milk, G. A. Olson (*Jour. Indus. and Engin. Chem., 1 (1909), No. 4, pp. 253–256*).—In this article the ratio of protein to other milk solids is discussed. The author thinks that this ratio is very constant, and may be considered as 1:1.34. "The protein content of normal milk can be calculated with a fair degree of accuracy when the total solids are known by the formula (TS)—TS/1.34=P. The percentage of casein can be found by multiplying the percentage of protein by 0.8."

The determination of sugar in cow's milk, H. J. Wijsman and J. S. Meulenhoff (*Pharm. Weekbl., 45 (1908), No. 42, pp. 1298–1305*).—This is a discussion of polarimetric methods of determining the percentage of lactose.

The determination of milk sugar with ammonia-copper solution, Y. Shimidzu (*Biochem. Ztschr., 13 (1908), No. 3–4, pp. 243–261; abs. in Milchw. Zentbl., 5 (1909), No. 2, p. 89*).—The method recommended by the author is to invert with hydrochloric or sulphuric acid and then titrate with ammoniacal copper solution according to the Pavy-Kumagawa-Sutō method.

A comparison of methods for the preparation of milk serum, H. C. Lythgoe and L. I. Nurenberg (*Jour. Indus. and Engin. Chem., 1 (1909), No. 1, pp. 38–40*).—Various methods of preparing milk serum for the determination of the index of refraction have been tested, with the following results: The asaprol method is easiest of manipulation, gives the clearest serum, but decomposes readily. The calcium chlorid method is difficult of manipulation and liable to give a cloudy serum. The natural souring method is too slow for ordinary use, but is a valuable method for use in hot weather. Four years' use of the acetic method has shown it to be reliable, easy of manipulation, and giving concordant results.

On the value of reductase as a test for impurity of milk, C. Barthel (*Rev. Gén. Lait, 7 (1908), Nos. 1, pp. 1–9; 2, pp. 25–33; 3, pp. 49–56; abs. in Hyg. Rundschau, 19 (1909), No. 1, p. 33*).—From his experiments the author concludes that reductase in milk furnishes a shorter means for judging as to the bacterial content of milk than the fermentation test. Ten cc. of milk is placed in a tube and 0.5 cc. of methylene blue added, 2 cc. of liquid paraffin being poured on top to prevent contact with air. Sanitary milk will stand for 3 hours before it becomes discolored.

The distillation of butter fat, coconut oil, and their fatty acids, K. S. CALDWELL and W. H. HURTLEY (*Chem. News, 99 (1909), No. 2573, p. 141*).—The authors are of the opinion that fats and fatty acids have no boiling-points in the vacuum of the cathode light, but that for any particular substance a temperature can be selected at which evaporation occurs at a speed convenient for fractional distillation.

"Butter fat, coconut oil, and their fatty acids were distilled in the vacuum of the cathode light. The lowest fraction obtained from butter fat distilled with the bath temperature at 250 to 270° and inner thermometer at 187 to 210°. Tributyrin distills rapidly with the bath temperature at 127° and inner thermometer at 107°. For this and other reasons, it is concluded that butter does not contain tributyrin. The iodin numbers yielded by the various fractions seem to indicate that there is little or no triolein in butter fat. Lauric acid forms at least 60 per cent of the fatty acids in coconut oil, whilst it could not be detected in butter; this method of distillation enabled the authors to detect with ease the presence of 10 per cent of coconut oil in butter. The presence of palmitic acid in coconut oil has been questioned by Ulzer, but the authors isolated several grams of this acid from coconut oil."

Metallic salts of the volatile fatty acids of butter fat and coconut oil, C. PAAL and C. AMBERGER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 1, pp. 1–22; abs. in Jour Soc. Chem. Indus., 28 (1909), No. 3, p. 157; Ztschr. Angew. Chem., 22 (1909), No. 8, p. 355; Analyst, 34 (1909), No. 396, pp. 99–101*).—The volatile fatty acids of butter fat and coconut fat showed great differences when precipitated with salts of zinc, cadmium, silver, barium, and other metals.

Detection of coconut oil in butter, C. PAAL and C. AMBERGER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 1, pp. 23–51, fig. 1; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 3, pp. 156, 157; Ztschr. Angew. Chem., 22 (1909), No. 8, p. 354; Analyst, 34 (1909), No. 396, pp. 99–101*).—The method described is based on the principle noted above. A specially constructed flask is used to avoid irregularities which commonly occur during distillation, and a device in the neck of the tube prevents particles of fat or water from being mechanically carried over.

"So far the following limits have held good: Butter may be regarded as adulterated with coconut oil, (1) when the cadmium value exceeds 100 and the Juckenack-Pasternack difference lies within the limits of +4.25 and —3.5; (2) when the cadmium value exceeds 110, while the saponification value does not exceed 235 or the Juckenack-Pasternack difference exceed —8; (3) when with a saponification value not exceeding 235, but with a Juckenack-Pasternack difference of more than —8, the cadmium value exceeds 120; (4) when the cadmium value exceeds 130 and the saponification value 235; (5) butter with a Reichert-Meissl value of 28.0 and over need not, for practical purposes, be taken into consideration."

Determination of the Maumené value of oils and fats, M. TORTELLI (*Chem. Ztg., 33 (1909), Nos. 15, pp. 125, 126, figs. 2; 16, pp. 134, 135; 20, pp. 171, 172; 21, pp. 184, 185; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 5, p. 250*).—The author shows the relationship between the iodin and Maumené value when an oil is treated directly with sulphuric acid in a vacuum-jacketed tube. The method is recommended as a means of detecting foreign fats in butter as the ratios between the two values decrease with the iodin value. With 4 samples of butter the ratio varied from 1.03 to 1.06, with margarin from 1.33 to 1.49, and with coconut oil from 0.31 to 0.34.

Halphen's test for cotton-seed oil, H. WAGNER and J. CLEMENT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 16 (1908), No. 3, pp. 145–160, fig. 1; abs. in*

Jour. Soc. Chem. Indus., 27 (1908), No. 18, p. 948).—The author describes his experience with this test under varying conditions. The proportion of carbon bisulphid and amyl alcohol may be reduced to 3 cc. for 5 gm. of fat. The reaction is more sensitive if the test is made with closed flasks capable of resisting pressure than if made in the usual way. Oils that have been exposed to light and air for some time often fail to react.

Valuation of willow bark by von Schroeder's hydrometer method, W. Appelius and F. Merkel (*Jour. Soc. Chem. Indus., 28 (1909), No. 4, p. 211*).—Willow bark is used extensively in Russia for tanning both light and heavy leather. The authors used von Schroeder's hydrometer method for the valuation of willow bark and find it to give results similar to those obtained by chemical analysis.

A sensitive reaction for galalith, L. Wolter (*Chem. Ztg., 33 (1909), No. 2, pp. 11, 12; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 2, p. 101*).—The author has found that fuming nitric acid affords a means of detecting galalith when used to imitate tortoise shell. When so treated galalith yields a heavy yellow crystalline powder, while tortoise shell dissolves with the exception of a few transparent scales.

A vegetable tallow from Irvingia oliveri, C. Crevost (*Bul. Écon. Indo-Chine, n. ser., 11 (1908), No. 70, pp. 134, 135*).—Chemical analyses of the seed and of the oil obtained from the seed of this plant, from which a vegetable tallow is made, are reported.

[Miscellaneous analyses], D. Hooper (*Ann. Rpt. Indian Mus. Indus. Sect., 1907–8, pp. 10–18; abs. in Jour. Soc. Chem. Indus., 27 (1908), No. 17, pp. 906, 907*).—Analytical data are reported of crude lac, shellac, sealing wax, gamboge, turpentine oil, animal oils, tans, brick cutch, 3 new kinos, and of the oils from the seeds of the following plants: *Terminalia catappa, T. belerica, T. chebula, Cucurbita pepo, C. maxima, Cucumis sativus, Luffa ægyptiaca, Citrullus colocynthis, Garcinia morella, G. cambogia, G. indica, Mesua ferrea, Sterculia fœtida, Chrozophora verbascifolia*, and *Lawsonia alba*.

Report of the work in 1908 of the analytical laboratory of Liége, M. de Molinari (*Rap. Trav. Lab. Anal. Liége, 1908, pp. 15*).—Analyses of fertilizers and feeding stuffs are reported. In all 7,077 samples were analyzed.

Report of the agricultural chemist of the Royal Danish Agricultural Society, 1908, K. Rördam (*Tidsskr. Landökonomi, 1909, No. 4, pp. 214–238*).—Brief discussions of the main results of examinations made during the year are given, with methods of analysis followed.

Report of agricultural chemical analyses, Stein's Laboratory, 1907, F. Christensen (*Tidsskr. Landökonomi, 1908, No. 5, pp. 299–320*).—The report contains a discussion and summary of analytical work done by the Municipal Laboratory in Copenhagen during the year. The total number of samples of feeding stuffs, fertilizers, dairy products, etc., analyzed in 1907 was 20,442, nearly half of the number being cream samples.

Report of the chemical station at Alnarp, 1908, M. Weibull (*Malmö. Läns Hushåll. Sällsk. Kvrtlsskr., 1908, No. 4, pp. 910–928*).—The results of chemical analyses of 2,020 samples of dairy products, feeding stuffs, soils, fertilizers, etc., are given and, in some cases, discussed briefly.

[Miscellaneous analyses] (*Jahresber. Landw. Kammer Wiesbaden, 1907, pp. 119–122*). Analyses are reported of fertilizers, feeding stuffs, and other agricultural substances.

Progress in agricultural chemistry in the year 1908, A. Stutzer (*Chem. Ztg., 33 (1909), Nos. 25, pp. 217, 218; 26, pp. 230, 231*).—A digest of the literature on this subject.

Progress in agricultural chemistry for the second half of the year 1908 (*Chem. Ztschr., 8 (1909), No. 5, pp. 49–51*).—This is a review of the literature of the more important results of investigations in agricultural chemistry.

International catalogue of scientific literature. D—Chemistry (*Internat. Cat. Sci. Lit., 5 (1908), pp. VIII+1202*).—This is the fifth annual issue of this catalogue (E. S. R., 18, p. 711). The literature indexed is chiefly that of 1905, but some references to literature published from 1901–1904 are included.

International catalogue of scientific literature. D—Chemistry (*Internat. Cat. Sci. Lit., 6 (1909), pp. VIII+1078*).—This is the sixth annual issue of this catalogue.

Proceedings of the twenty-fifth annual convention of the Association of Official Agricultural Chemists, held at Washington, D. C., November 12–16, 1908, edited by H. W. Wiley (*U. S. Dept. Agr., Bur. Chem. Bul. 122, pp. 248, figs. 6*).—This is the official report of the proceedings of the convention. A summarized account of the meeting has been previously given (E. S. R., 20, p. 395), and a circular of the Bureau containing extracts from the proceedings noted (E. S. R., 20, p. 911).

METEOROLOGY—WATER.

Monthly Weather Review (*Mo. Weather Rev., 36 (1908), No. 13, pp. X+435–478, figs. 4, charts 6*).—This summary "is based essentially upon data received from about 200 regular Weather Bureau stations, 33 regular Canadian stations, and from such climatological stations as have forwarded their annual summaries in time." It also includes the annual report of the Chief of the Weather Bureau reprinted from the report of the Secretary of Agriculture for 1908 (see p. 192), and the following special articles: Atmospheric Influences Causing Movements of the Soil; Studies on the Phenomena of the Evaporation of Water over Lakes and Reservoirs (illus.), by F. H. Bigelow (see p. 115); The Climate of the Historic Past (illus.), by E. Huntington; Weather Bureau Men as Educators; The Diurnal Variation of the Rainfall at Kingston, Jamaica, by M. Hall; and The Teacher and the Student.

"Compared with the normal the barometric pressure for the year 1908 was in excess by small amounts over all portions of the United States, except a small area from Michigan westward to the valley of the Red River of the North, and in extreme eastern New England. . . .

"The average temperature . . . was above the normal in all districts of the United States and Canada, except over the Rocky Mountain and southern portion of the Plateau districts, and along the immediate Pacific coast. . . .

"The annual precipitation . . . was less than the usual amount over all districts east of the Mississippi, except along the eastern slopes of the Appalachian Mountains from northern Virginia to western South Carolina, over the greater portions of the lower elevations of Virginia and North Carolina, and along the eastern and southern coasts of Florida. Precipitation was also below the normal over the greater portions of Arkansas, Louisiana, and Texas, in the southern Rocky Mountain region, and generally over the Plateau and Pacific coast States. From the Mississippi River westward to the Rocky Mountain districts, except in the portions of Arkansas, Louisiana, Texas, and the southern Rocky Mountain region mentioned above, the precipitation for the year was above the normal. At points in southern Kansas, central Oklahoma, and northern Texas the excess ranged from 10 to 20 in.

"The most pronounced feature of the weather of the year 1908 was the remarkably severe and long-continued drought during the late summer and early fall months over the greater part of the Ohio Valley and Lake region, portions

of the Middle Atlantic States, and New England. The combined effect of high temperature and deficient rainfall during the latter part of August and throughout the most of September, October, and November resulted in one of the most disastrous droughts in the meteorological history of those districts."

Monthly Weather Review (*Mo. Weather Rev., 37 (1909), Nos. 1, pp. 1–42, figs. 13, charts 11; 2, pp. 43–84, figs. 5, charts 8*).—In addition to the usual reports on forecasts, warnings, weather and crop conditions, meteorological tables and charts for the months of January and February, 1909, recent papers bearing on meteorology and seismology, recent additions to the Weather Bureau library, Weather Bureau men as educators, etc., these numbers contain the following articles and notes:

No. 1.—The Pressure of a Saturated Vapor from Water and Ice as Measured by Different Authorities, by C. F. Marvin; Summer and Winter Vertical Temperature Gradients, by W. J. Humphreys; The Formation of Hail, by J. B. Gibson; The Importance of Systematic Observation of Persistent Meteor Trains, by C. C. Trowbridge; Transformations of Snow Crystals, by A. Erman; The Crystallization of Undercooled Water (illus.), by B. Weinberg; Recent Extensions of the Canadian Meteorological Service; Theories of the Color of the Sky, by E. A. Nichols; Duststorms in Texas; The Aurora Polaris; A Study of Overcast Skies (illus.), by E. L. Nichols; Rain with Low Temperature, by A. L. Rotch; Great Inversions of Temperature, by A. J. Henry; A Portable Rotation Psychrometer (illus.), by P. J. O'Gara; The Psychrometer—rotated, whirled, ventilated; The Source of Our Cold Waves, by R. F. Stupart; The Climate of the Glacial Epoch, by H. Arctowsky; A Plea for Terrestrial and Cosmical Physics, by L. A. Bauer; and Retirement of Professor Klossovskii, by A. Ziwet.

No. 2.—Summary of Ice Conditions of the Great Lakes, by N. B. Conger; Studies on the Vortices in the Atmosphere of the Earth (illus.), by F. H. Bigelow; Dry Farming; Some Climatic Features of Wyoming, and Their Relation to Dry Farming (illus.), by W. S. Palmer (see p. 114); Attendance on Scientific Meetings, by W. J. Humphreys; A Proposed New Formula for Evaporation (illus.), by C. F. Marvin; Changes in the Monthly Weather Review; Weather Words in All Languages; Winter Aridity Indoors, by M. S. W. Jefferson; Influence of Mountains and Coasts on Storms, by D. T. Smith; Barometric Pressure and Earth Pulsation, by N. Shimono; Researches on the Solar Constant and the Temperature of the Sun, by J. Scheiner; The Blanket Effect of Clouds, by W. W. Coblentz; Mean Annual Temperatures for Mexico and Central America; and An Annotated Bibliography of Evaporation, by Mrs. G. J. Livingston.

[Annual meterological summary, 1908], A. J. Mitchell (*Fla. Quart. Bul. Agr. Dept., 19 (1909), No. 2, pp. 25–41*).—This is the report of the Florida section of the Climatological Service of the Weather Bureau of this Department, and contains summaries of the weather conditions (temperature, including killing frosts, precipitation, and cloudiness) during each month of the year, based upon observations at a large number of stations in different parts of the State.

Meteorological observations (*Maine Sta. Bul. 163, pp. 387–389*).—The usual summaries of observations on pressure, temperature, precipitation, cloudiness, and wind movement at Orono, Me., and on precipitation at various places in the State during 1908 are given. The mean atmospheric pressure for the year at Orono was 29.85 in. The mean temperature was 44.66° F., the mean for 40 years being 42.27°. The total precipitation was 37.51 in., the mean for 40 years being 43.58 in. The snowfall was 73.2 in., the average for 40 years being 91.4 in. The number of cloudy days was 127.

"The year 1908 differed from the average year in several very important respects. Every month but three was warmer than the average. January was

especially warm, the mean temperature for the month being 6.4° higher than the average for the past 40 years. The highest temperature reached was 97° on July 7; and the lowest −24° on February 5. May and October were warm months, and but for the prolonged droughts of June and September the growing season would have been exceptionally long.

"The precipitation for the year was light, over 6 in. below the average. During the period of 47 days, from June 1 to July 17 inclusive, only 2.1 in. of rain fell; and from August 18 to October 1 inclusive, 48 days, the total precipitation was 0.99 in."

Relation of the weather service to the farmer, J. F. Voorhees (*Tenn. Sta., Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 99–102, charts 5*).—A series of charts based upon data obtained at about 25 stations in middle Tennessee during a period of from 11 to 30 years and showing average date of the last killing frost in the spring and the first in the fall, average length of growing season, mean temperature, and rainfall, is given.

Some climatic features of Wyoming, and their relation to dry farming. W. S. Palmer (*Mo. Weather Rev., 37 (1909), No. 2, pp. 54–56, figs. 2*).—This article summarizes data collected during the last 17 years on precipitation, temperature, and sunshine with reference to dry farming in Wyoming.

It is stated that "while the average amount [of precipitation] for the State is 13.68 in., there is a wide variation in the normal amounts received over the various sections of the State. There are portions of Big Horn and Sweetwater counties where the average annual precipitation is probably less than 5 in., while over the extreme northeastern and the extreme northwestern portions of the State there may be a few sections where the annual average is nearly 20 in." A map is given showing the variations in annual precipitation in different parts of the State. As regards seasonal distribution, it is shown that "about 70 per cent of the total annual amount falls during the six months, March to August, inclusive. . . .

"The varied topography of the State gives a wide variation in the temperature conditions of the various sections of the State. In some sections the growing season is from 4 to 5 months in duration and summer temperatures rise to 95° or 100°, or even higher; over some of the higher agricultural districts the growing season is short, summer temperatures never rise above 95°, frosts may be experienced in any month, and only the hardier grains and vegetables can be successfully grown."

The percentage of sunshine is very large and is an important factor in agricultural production in the State. The possibility of extending the farming area, and particularly of developing a seed breeding industry, is discussed.

Weather conditions and statistics, G. Harcourt (*Ann. Rpt. Dept. Agr. Prov. Alberta, 1907, pp. 47–57*).—The character of the weather of each month of 1907 is described, with tabular summaries of observations on rainfall and temperature at the various meteorological stations in the Province of Alberta. A statement is also given showing the amount of crop insurance against hail during the year following the inauguration of the policy of such insurance by the territorial government. It is shown that of the 700,000 acres under crop in the province 4.4 per cent was insured against hail. About 8 per cent of the insured acreage was damaged by hail, the average indemnity received per acre being $1.62.

On the climate of Sitka, J. Krčmář (*Met. Ztschr., 25 (1908), No. 7, pp. 315–320*).—All of the available records, in some cases running back to 1828, are summarized in this article.

[Meteorological observations in Orange River Colony, 1907–8], J. Lyle (*Dept. Agr. Orange River Colony, Ann. Rpt., 1 (1907–8), pp. 307–311*).—Tables

are given which summarize the results of observations on rainfall at over 200 stations in the colony during the year ended June 30, 1908. Temperature and pressure records for a limited number of stations during the same period are also given.

Studies on the phenomena of the evaporation of water over lakes and reservoirs, F. H. BIGELOW (*Mo. Weather Rev., 36 (1908), No. 13, pp. 437–445, fig. 1*).—This is a fourth paper on this subject (E. S. R., 19, p. 1112), and deals with the progress in 1908 and proposed extension of the work, together with an analysis and application of the evaporation formula with special reference to observations at Indio and Mecca, Cal.

The significance of Bacillus coli in potable waters, GUIRAUD and H. MAUDOUL (*Ann. Inst. Pasteur, 22 (1908), No. 11, pp. 917–926, figs. 2*).—This is an article based upon studies of the water supply of Toulouse, the general conclusion from which is that the presence of the coli bacillus in the water supply is intimately connected with the existence of causes of contamination. Its abundance is directly related to the importance of these causes. While the bacillus itself does not constitute a grave danger, it furnishes a valuable index of infection.

The rôle of septic tanks in the biological purification of sewage water, A. MÜNTZ and E. LAINÉ (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 10, pp. 597–601*).—The most useful rôle of septic tanks in these experiments appeared to be as a means of decantation of matter in suspension. It is thought that it might be profitable to inquire whether some less cumbersome and costly method of accomplishing this result may not be devised.

SOILS—FERTILIZERS.

Inquiry into the causes of the decrease in fertility of some soils in the Groningen and Drenthe moor colonies, B. SJOLLEMA and J. HUDIG (*Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat. [Netherlands], 1909, No. 5, pp. 29–157, pls. 2, dgms. 11*).—The investigation of which this is a preliminary report was begun in 1905 with field observations to determine in a general way the nature and extent of the so-called "oat sickness."

It was found that for several years the productive power of certain fields in the Groningen and Drenthe moor colonies had been decreasing; oats was the crop chiefly affected, but rye and potatoes have also suffered. In the case of oats, usually in the month of May, the leaves gradually turn yellow and have a sick appearance; withered spots appear on the leaves and the affected leaves fold and droop. Following the field observations field and culture tests were carried on at the Groningen Experiment Station.

It is concluded from the results of 3 years' tests that the unhealthy properties of the moor-colony soils are due to faulty treatment, especially as regards fertilization. As a rule the application of too much lime or calcareous fertilizers is a cause of sickness, while physiologically alkaline fertilizers (as nitrate of soda) and also fertilizers which increase the production of alkaline humates are unfavorable. By such treatment the properties of the soil are modified in various respects; besides neutralizing the original acid reaction, changes take place in the behavior of the organic constituents (humate-silicate compounds), especially toward oxygen.

On soils still normal care must be observed in the application of such fertilizers and on soils already unfavorably affected these fertilizers must be avoided or at least alternate applications of acid and physiologically acid fertilizers must be made.

Sick soils can best be cured by materials which restore the original acid reaction; acid canal sediment and moor peat turf are best for this purpose. The same change can be brought about by use of acid artificial fertilizers, but they are not so effective if the abnormal condition is marked. A sick crop can be restored to health by the immediate application of manganese sulphate; this has no beneficial effect if applied beforehand, as it does not remain in an effective form in the soil. The explanation of the effect of manganese sulphate is not found in an insufficient content of manganese in the soil.

The properties of the humate-silicate compounds in sick and normal soils vary as follows: Normal soils contain more alkali-soluble (in 5 per cent ammonia) compounds. The composition of these compounds easily soluble in ammonia is the same in sick and normal soils, while the difficulty soluble in normal soils contains more silicic acid, iron, and aluminum; the insoluble in sick soils contains more lime and also more iron than in the normal soils, though the total iron content of sick soils is lower than that of normal soils. The insoluble compounds in sick soils, like the soluble, are poorer in silicic acid than in normal soils; the latter contain more colloidal silicic acid than the former.

The capacity for absorbing potassium and ammonia is higher in sick than in normal soils, or at least never lower. In both soils a great deal of the amount absorbed is easily washed out and the amount washed out is greater in the case of the sick soil; in an alkaline reacting humate this goes into solution.

Sick and normal soils vary in respect to physical properties. Normal soils under most conditions when sampled in the field seem to contain more moisture, which may be ascribed to the higher content of organic matter. Sick soils have a looser structure and contain organic matter which swells more with the addition of moisture than that contained in normal soil.

Considering the differences in properties of sick and normal and of those recovering—both soil and crop—it is to be concluded that the alkaline reaction (including the action of added nitrates) of the soil plays an important part in the occurrence of "oat sickness." It is suggested that by the increased "autoxidation" which is the result of this alkaline reaction, great quantities of compounds (peroxids) injurious to plants are formed and the favorable action of the manganese sulphate is due to the catalytic decomposition of these injurious peroxids.

Experiments with soils, fertilizers, and farm crops, C. A. MOOERS (*Tennessee Sta. Bul. 86, pp. 35–76, 83–88; Rpt. Coop. and Ed. Work Agr. Middle Tenn. 1907–8, pp. 7–48, 55–60*).—This reports the results of two years' experiments which were undertaken primarily for the purpose of securing information regarding the fertilizer requirements of various soil types in middle Tennessee. The experiments were as a rule made on fortieth-acre plats of as uniform soil as it was possible to secure. Chemical analyses were made of the soils.

The systems of fertilizing employed included the use of various mixtures of chemical fertilizers, farm manure, and green manure (cowpeas). The crops used in the fertilizer experiments were wheat, corn, sorghum, millet, tobacco, cantaloups, buckwheat, peanuts, clover, and potatoes.

The results of the experiments agree in showing that the soils of the Central Basin are as a rule well supplied with the mineral elements of plant food (phosphoric acid, potash, and lime). Occasionally, however, areas were found which responded to phosphatic fertilizers. The principal requirements of the soils seem to be nitrogen and organic matter. The sandy loam soils of the Cumberland Plateau were found to be very deficient in phosphoric acid and lime. The gray soils of the Highland Rim were apparently particularly deficient in phosphoric acid, although also in need of potash. The limestone soils of this area

were also found to be deficient in phosphoric acid but fairly well supplied with potash. Nitrogen and vegetable matter were apparently generally needed.

A comparison of the results of chemical analysis with those obtained in the field experiments showed a very close agreement in regard to the indicated needs of plant food. Summing up this comparison it is stated that "the results of the field experiments demonstrate the immediate response to the elements of plant food as applied. The amounts of the various materials that may be used with profit are also indicated. The chemical analysis, on the other hand, only indicates the probable immediate need of the different elements, but demonstrates the extent of the total available soil supplies, a matter of very great importance."

Soil drainage and fertility, T. L. LYON, G. W. CAVANAUGH, and E. O. FIPPIN (*New York Cornell Sta. Circ. 4, pp. 4*).—This is a concise summary of information regarding the principal causes of decline in fertility of soils and practical means of improving productiveness.

Judging of the productiveness of soils by their composition, M. FLEISCHER (*Deut. Landw. Presse, 36 (1909), No. 26, p. 288*).—It is pointed out that the content of fine particles and the mineralogical character of the coarse particles as well as the chemical composition and the solubility of the constituents should be taken into account in judging soils.

The salinity of soils, L. DUMAS (*Ann. Gembloux, 19 (1909), No. 4, pp. 227–231*).—This is a general discussion of the character and function of the soluble saline constituents of the soil.

On certain physical-chemical processes in the formation of soils, II, ROHLAND (*Landw. Jahrb., 38 (1909), No. 2, pp. 273–278; abs. in Chem. Zentbl., 1909, I, No. 14, p. 1188*).—The author corrects an error in statements by Ehrenberg relating to previous investigations by the author on plasticity of clay, coagulation, etc. (E. S. R., 19, p. 620; 20, p. 818).

Observations and researches on soil temperature, III, S. DE GRAZIA (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 383–400; Staz. Sper. Agr. Ital., 41 (1908), No. 9–11, pp. 739–756; abs. in Chem. Zentbl., 1909, I, No. 12, p. 1035*).—This is a third report on the same general subject (E. S. R., 21, p. 20), but dealing specifically with the causes of the rise in soil temperature produced by certain organic manures. The two principal factors of such increase being fermentation of the organic substances and the aeration which they make possible in the soil, the object of the study was to determine the relative importance of these factors.

By the use of peat, pieces of glass tubes, whole straw, finely cut straw, potatoes, glucose, straw infusion, and potassium phosphate singly and combined in various ways it was possible to secure the following conditions: No aeration with slight and active fermentation; marked aeration with no and active fermentation; good aeration with slight fermentation; and fair aeration with fair fermentation. It is concluded that both aeration and fermentation are causes of increase of soil temperature, but that probably the latter is the more important. The fermentation seems actually to produce heat while aeration enables the soil to retain both the heat due to fermentation and any which it may have acquired from the surrounding air.

Tanks for soil investigation at Cornell University, T. L. LYON (*Science, n. ser., 29 (1909), No. 746, pp. 621–623, figs. 2*).—The construction of a series of concrete tanks each 4 ft. 2 in. square with a maximum vertical depth of 4 ft. 6 in. and a minimum depth of 4 ft., to be used in soil investigations of various kinds, is described.

On a method of bacteriological investigation, H. FISCHER (*Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 18–23, pp. 654, 655; abs. in Chem. Zentbl., 1909, I,*

No. 13, pp. 1113, 1114). Tests of Remy's method, using extracts of a sandy soil and of a clay soil and making reciprocal inoculations with the two soils, gave variable results under apparently similar conditions. These differences are attributed not to the inoculation but to the character of the soil extract used.

Bacteriological-chemical investigations, O. LEMMERMANN, H. FISCHER, ET AL. (*Landw. Jahrb., 38 (1909), No. 2, pp. 319–364; abs. in Chem. Centbl., 1909, I, No. 14, pp. 1187, 1188; Jour. Soc. Chem. Indus., 28 (1909), No. 9, p. 485*).—Studies of the putrefactive and nitrogen-fixing power, nitrification, and denitrification in moor and cultivated soils handled in different ways, as shown by number, distribution, and kind of bacteria and molds, are reported.

The authors conclude that changes which go on in the soil should be studied under as natural conditions as possible. Sand culture methods were not found to be a reliable means of studying changes in the decomposition of the nitrogenous organic matter of the soil nor of the action of various methods of fertilizing. In the study of denitrification the sand culture method showed that the denitrifying organisms were more active in mineral soils than in moor soils. The addition of lime promoted denitrification both in the moor soils and in sandy soil. Denitrification was much greater in sand cultures than in ordinary soil cultures. Sulphate of ammonia was more rapidly transformed in moor soils fertilized with Thomas slag and kainit than in loam soils. The greater part of the nitrogen of the sulphate was converted into nitric acid and this was the more completely brought about in the case of the moor soils.

Sterilization had little effect upon the nitrogen compounds in sand and loam soils, but in case of humus soils it increased the amount of nitrogen driven off in distillation with magnesia. The nitrogen of sterilized mineral soils was, however, more easily decomposed by bacteria than that of humus soils similarly treated. In ordinary soil cultures nitrification went on less rapidly in sandy soils than in loam soils. Sterilization with subsequent inoculation lengthened the period of nitrification, but did not affect the original nitrifying power. Drying reduced the nitrifying power but not the denitrifying power. Sterilized soils which were subsequently inoculated did not completely recover their characteristic power of decomposing nitrogenous organic matter. Lime nitrogen underwent very slight decomposition during 22 days in unsterilized soil. Ammonia formation and nitrification can go on simultaneously in natural soils. The effect of different kinds of soil on the decomposition of bone meal can be studied in soil cultures, but not in sand and water cultures.

Studies of changes which go on in soils must be made with fresh soils and the progress of decomposition must be determined analytically throughout the period of the experiment.

Investigations on bacterial growth in sterilized soils, H. FISCHER (*Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 24–25, pp. 671–675*).—Soils sterilized by steam and then inoculated showed greater bacterial activity than those not so treated. The increased activity is attributed less to purely chemical effects of the sterilization than to nutritive matter furnished by the remains of the organisms killed by the sterilization.

Studies in soil bacteriology, I. Nitrification in soils and in solutions. F. L. STEVENS, W. A. WITHERS, ET AL. (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 10–13, pp. 355–373*).—A series of comparative studies of nitrification in soils and in solutions is reported from which the following conclusions are drawn:

"(1) Many soils which can nitrify ammonium sulphate and cotton-seed meal mixed with them, fail to nitrify ammonium sulphate and cotton-seed meal when used as the inoculum for solutions, such as those of Omelianski, Wiley, and Ashby.

"(2) Nitrification is nil or very slight in saturated soils.

"(3) Nitrification in some soils proceeds as fast as ammonification, converting the ammonia to nitrate as fast as it is rendered available by the ammonifying organisms.

"(4) Nitrification in extract of soil is, in some instances, very slight as compared with nitrification in the soil itself.

"(5) Nitrification in soils increases in intensity with the amount of inoculum used.

"(6) Some nitrifying soils do not nitrify when placed in solutions even though a very large inoculum is used.

"(7) Nitrifying organisms from sewer beds nitrified better in solutions than in soils.

"(8) Tests in solutions are not adequate to indicate the nitrifying vigor of a soil."

Studies in soil bacteriology, I. Nitrification in soils and in solutions, F. L. STEVENS, W. A. WITHERS, ET AL. (*North Carolina Sta. Rpt. 1908, pp. 40–63*).—Noted above from another source.

Investigations on the process of nitrogen assimilation in its relation to soil climate, T. REMY (*Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 18–23, pp. 561–651, pls. 11, fig. 1; abs. in Chem. Zentbl., 1909, I, No. 13, p. 1109; Jour. Chem. Soc. [London], 96 (1909), No. 558, II, p. 340*).—Delbrück's use of "soil climate" to mean the sum of life conditions in nutrient media (soils) is followed in this article, which deals not only with the relation between soil climate and the nitrogen fixing power of soils, but also with the best methods of measuring the latter. Numerous investigations, some of them going back as far as 1902, in which the author's well known methods were employed, are quite fully reviewed. These investigations, which have been in large part already noted, dealt mainly with the effect on bacterial activity of cultivation and other forms of soil manipulation, fertilizers and other nutrient substances, acidity, basicity, moisture, nitrogen content, and various other conditions in soils and media.

The experiments show in general that both in small laboratory experiments and in experiments with larger amounts of soil there is a considerable fixation of nitrogen and that this nitrogen is a useful source of supply of this constituent to higher plants, being not less readily available than the best forms of organic nitrogenous fertilizers.

The possibility of working out practical means of increasing and controlling the fixation of nitrogen in soils is discussed. In general the conditions which are to be sought in practice are those which increase the stock of humus in the soil and at the same time promote its decomposition to yield readily assimilable sources of energy to the nitrogen fixing organisms.

On nitrification in soils in place, POUGET and GUIRAUD (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 11, pp. 725–727; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 13, p. 411; Chem. Zentbl., 1909, I, No. 19, p. 1601; Chem. Abs., 3 (1909), No. 13, pp. 1166, 1167*).—Investigations are reported which show that during the winter on the Algerian seacoast nitrification in place is not retarded except when the soil is water-logged by excessive rain, but that when it is thus interrupted it starts again with difficulty and does not become active until about the end of May, nearly a month after the close of the rainy season. During summer nitrification is active in a compact soil, but is often accompanied by denitrification. The decrease of the nitric nitrogen content of the soil during this season can not be attributed to drainage, because the rainfall is small and the rapid evaporation from the soil would tend to concentrate the nitrates in

the surface soil. All forms of tillage of the soil which tend to increase aeration promote nitrification and diminish denitrification.

It was observed that in February and April on a compact soil such as is found in a wheat field there was no evidence of nitrification. The author concludes that as this is a period of very active nitrogen assimilation by wheat its supply of this material must be obtained from ammoniacal compounds.

The gum produced by Bacillus radicicola, R. E. BUCHANAN (*Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 11–13, pp. 371–395; abs. in Chem. Ztg., 33 (1909), No. 35, Repert., p. 167*).—A detailed study of the composition of this gum and of the conditions affecting its production is reported, with a bibliography of the subject.

Nitro-bacterine, nitragin, or soil inoculation, H. VON FEILITZEN (*Svenska Mosskulturför, Tidskr., 23 (1909), No. 2, pp. 154–163, pl. 1, fig. 1; Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 10–13, pp. 374–378, pls. 2*).—The results of experiments on a virgin white moor soil at Flahult led the author to conclude that there is no occasion to abandon the advice previously given farmers to use soil inoculation, which always produces a certain and favorable effect. Preparations of bacteria cultures are more or less uncertain.

New ideas and new experiments in fertilization and inoculation of the soil, I. GIGLIOLI (*Nuovi Concetti e Nuove Esperienze nella Concimazione ed Inoculazione dei Terreni. Rome, 1908, pp. 58, figs. 7; Bol. Quind. Soc. Agr. Ital., 13 (1908), No. 22, pp. 974–1027, figs. 7*).—This paper is in the nature of a résumé of knowledge relating to oxidation and oligodynamic constituents of the soil; enzymic action of roots upon the organic matter of the soil; use and function of manganese as a fertilizer; new cultural experiments with manganese dioxid and with manganese salts; the law of the minimum in biologic action; roots and their toxins; and organic inoculation of the soil. It concludes with a brief biographical sketch of Torricelli and Barbieri, pioneers in the field of the physics and chemistry of the atmosphere.

Fertilizer problems, WEIN (*Illus. Landw. Ztg., 29 (1909), Nos. 15, pp. 129–132; 16, pp. 143, 144*).—This is a review of various practical questions which have arisen in connection with the use as fertilizer of potash salts, phosphates, and nitrogen compounds, especially the synthetic nitrogen compounds which have been recently introduced.

Chemical industry and agriculture, A. FRANK (*Deut. Landw. Presse, 36 (1909), Nos. 19, pp. 209, 210; 20, pp. 222, 223; 21, pp. 233, 234; 22, pp. 247, 248; 24, pp. 267, 268*).—This article discusses the development of chemical industry in relation to the supply of plant food—phosphoric acid, potash, and nitrogen. The development of methods for the preparation of nitrogen compounds from the free nitrogen of the air receives particular attention.

On experiments to determine the need of phosphoric acid and potash in grass lands, P. LIECHTI (*Landw. Jahrb. Schweiz, 23 (1909), No. 1, pp. 25–61*).—The plan followed and the results obtained in the series of cooperative experiments in different parts of the Canton of Bern, Switzerland, with various fertilizer mixtures on grass lands, are given in this article.

Fertilizing with phosphoric acid alone increased the yield in about 61 per cent of the experiments, and the use of potash alone in about 52 per cent. The use of phosphoric acid and potash together increased the yield in about 80 per cent of the experiments. The addition of lime to phosphoric acid and potash was of very little benefit. The use of liquid manure gave higher results than a mixture of potash and phosphoric acid. In a number of cases no benefit was derived from the fertilizers during the first year, but when the average for three years was taken a decided benefit in many of these cases was noted.

thus showing the unreliability of conclusions based upon a single year's experiments.

Lime and nitrate of soda in beet culture, J. STOKLASA (*Bl. Zuckerrübenbau, 16 (1909), No. 2, pp. 17–23; abs. in Chem. Ztg., 33 (1909), No. 21, Repert., p. 97*).—The comparative experiments reported show that nitrate of soda gave not only a greater yield than nitrate of potash, but also a greater sugar content. This is ascribed to the fact that the sugar beet belongs to the Chenopodiaceæ, which are soda-loving plants. However, there was no evidence that soda was able to replace potash to any considerable extent as a plant food.

Lime niter and calcium cyanamid, H. VON FEILITZEN (*Svenska Mosskulturför. Tidskr., 23 (1909), No. 1, pp. 57–70, pls. 6; Mitt. Ver. Förd. Moorkultur, 1909, No. 1–2; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 557, II, p. 261*).—This paper contains a report on trials of these fertilizers with oats, potatoes, hemp, and grass on moor soils and sandy soils during the season of 1908. Good results were obtained in all cases.

A note on calcium cyanamid, H. VON FEILITZEN (*Chem. Ztg., 33 (1909), No. 29, p. 264; abs. in Ztschr. Angew. Chem., 22 (1909), No. 15, p. 687; Chem. Zentbl., 1909, I, No. 14, pp. 1202, 1203*).—Examinations of samples received directly from the factories in Norway and elsewhere showed the presence of considerable amounts of undecomposed calcium carbid. The average percentage of nitrogen in the material examined was 19.39.

Nitric acid manufactured from atmospheric nitrogen, J. A. FRIES (*Ann. Rpt. Penn. Dept. Agr., 13 (1907), pp. 408–415*).—This is a brief account of progress in the manufacture of calcium cyanamid and basic lime nitrate.

Methods of preparing ammonia and transforming it into nitrates, O. DONY-HÉNAULT and H. GALL (*Rev Électrochim. et Électrometal., 3 (1909), No. 2, pp. 39–43*).—This is a brief review of the development of electro-chemical processes for this purpose.

Investigations on intensive nitrification and on high-yielding niter beds, MÜNTZ and LAINÉ (*Monit. Sci., 4. ser., 22 (1908), I, Nos. 796, pp. 228–248, fig. 1; 797, pp. 308–320; II, No. 799, pp. 435–448, figs. 3; abs. in Chem. Zentbl., 1908, II, No. 9, pp. 817, 818*).—This is a detailed account of investigations which have already been referred to (E. S. R., 19, p. 524). The authors first discuss the conditions favoring nitrification and especially the influence of organic substances and temperature on the nitrification of ammonia salts in different soils. The construction of niter beds for the rapid nitrification of organic matter is then explained in detail.

The investigations reported indicate that peat is the best material for the construction of such beds. It is explained how beds of this material may be constructed so that there is a continuous conversion of ammonia salts into nitrates. It is estimated that by the use of the process described a peat bed of 2,471.04 acres and 6.56 ft. deep, with a nitrogen content of 2 per cent, will yield 800,000 to 900,000 tons of niter.

Sulphate of ammonia and nitrate of soda, J. BARCIA Y TRELLES (*Ann. Gembloux, 19 (1909), No. 4, pp. 223–226*).—A brief discussion of an article on this subject by Löhnis and Blobel (E. S. R., 20, p. 623).

Nitrate of soda, J. KEANE (*Agr. Students' Gaz., n. ser., 14 (1909), No. 3, pp. 77–81*).—This is a concise summary of the more important facts regarding the source of supply of nitrate of soda and its value and action as a fertilizer.

[Production, exportation, and consumption of nitrate in 1908] (*Asoc. Sal. Propaganda, Circ. Trimest. 46, 1908, pp. I–IV*).—The figures here reported by the Nitrate of Soda Propaganda indicate that the production of nitrate during

1908 was 2,163,787 tons as compared with 2,026,626 tons in 1907. The exportation in 1908 was 2,251,652 tons as compared with 1,818,093 tons in 1907. The consumption in 1908 is estimated to have been 2,016,136 tons as compared with 1,908,769 tons in 1907.

On the fertilizer action of peat nitrogen, HERRMANN (*Illus. Landw. Ztg., 28 (1908), No. 102, p. 872*).—Comparative pot tests are reported showing that taking the yield of rye without nitrogenous fertilizers as 100, the yield with stable manure was 153, while with moor peat it was 121 to 132 and with peat litter 95, although the latter supplied much more nitrogen than stable manure.

Potash fertilizing, SCHNEIDEWIND (*Landw. Wchnschr. Sachsen, 11 (1909), No. 14, pp. 150–152*).—The results of a large number of experiments on sandy soils poor in potash and on more productive soils with potatoes, beets, wheat, rye, barley, oats, leguminous plants, and meadow grasses are reported. The potash salts used were kainit and 40 per cent potash salt used in connection with manure and with a basal fertilizer supplying nitrogen and phosphoric acid.

The general conclusion reached is that it is not advisable to apply potash fertilizers in the spring if the season is very dry. In this case the application of potash salts as frequently results in injury as in benefit. The better class of soils, which do not form a crust when liberally fertilized with potash salts, may be so fertilized each year, but as a rule it is perhaps better to apply potash fertilizers every second or even third year, and to make the application only to such crops as are especially benefited by such fertilizers. The injurious effect of potash salts on the mechanical condition of the soil can be largely overcome by the use of caustic lime. Beneficial results from the use of potash fertilizers can be obtained only when the other fertilizing constituents are present in sufficient amount.

Notes on potash fertilizers, BACHELIER (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 2, pp. 92–99*).—Experiments with potash salts in combination with other fertilizers on beets and oats grown on a clay soil containing 0.13 per cent of potash are reported. This soil had been liberally fertilized in previous years with barnyard manure. The results indicate that on such a soil potash fertilizers are not needed and that under certain weather conditions an increase of potash exerts an injurious influence on the yield.

The discovery of potash salts in Alsace, L. PERVINQUIERE (*Rev. Sci. [Paris], 47 (1909), 1, No. 14, pp. 434, 435*).—Extensive deposits of potash salts which have been discovered near Mülhausen are briefly described.

The discovery of potash salts in Upper Alsace, J. VOGT and M. MIEG (*Bul. Soc. Indus. Mulhouse, 1908, Sept.-Oct.: abs. in Naturw. Rundschau, 24 (1909), No. 25, pp. 317, 318*).—The deposits discovered near Mülhausen are described. There are two layers of sylvinite, the upper 1.5 meters thick, the lower 2 to 3 meters thick. They contain on the average from 30 to 35 per cent of potassium chlorid (sylvin).

Tertiary potash deposits in Upper Alsace, F. MEINECKE (*Naturw. Wchnschr., 24 (1909), No. 17, pp. 268, 269*).—Extensive deposits are described.

Norwegian potash fertilizers, J. GRAM (*Tidsskr. Kemi, Farm. og Ter., 1907, pp. 252–255; abs. in Zentbl. Agr. Chem., 38 (1909), No. 3, p. 219*).—The preparation of potash salts from seaweed ash as a by-product of iodin manufacture, especially on the west coast of Norway, is described. Analyses of 30 per cent potash salt and 50 per cent chlorid produced are given.

The amount of potash annually carried into the sea by streams, P. KRISCHE (*Kali, 1909, pp. 75, 76; abs. in Chem. Ztg., 33 (1909), No. 30, Repert., p. 145*).—The amount is estimated at 50,000,000 tons, or about 100 times the potash production of Germany. It is estimated that the ocean contains about 450,000,000,000 tons of potash.

Production and consumption of phosphates in 1908–9 and in 1912, MAIZIÈRES (*Engrais, 24 (1909), No. 12, pp. 321, 322*).—The production of phosphates in 1908 is given in round numbers as 4,690,000 tons and the consumption as 4,590,000 tons. It is estimated that the production in 1909 will be, in round numbers, 5,000,000 tons, and in 1912, 6,000,000 tons.

Saving America's plant food, G. E. MITCHELL (*Amer. Rev. of Reviews, 39 (1909), No. 4, pp. 444–448, figs. 2*).—Attention is called especially to the necessity of conserving the phosphate resources of the United States and of further legislation to prevent waste.

Mineral resources of the United States, calendar year 1907.—Part II, Nonmetallic products (*U. S. Geol. Survey, 1908, pp. 897, pl. 1, figs. 6*).—This is the usual detailed report on this subject. The chapter of greatest agricultural interest is that relating to phosphates. See a previous note (E. S. R., 20, p. 430).

A much-neglected manure, A. E. DIXON (*Natal Agr. Jour., 12 (1909), No. 2, pp. 173, 174*).—The value and use of iron sulphate as a fertilizer are briefly explained.

Manganese as a fertilizer (*Mark Lane Express, 100 (1909), No. 4042, p. 305; Phosphate, 18 (1909), No. 886, p. 111*).—Investigations on this subject by Javillier, Lecarme, and others are referred to, and suggestions are made as to the best method of applying manganese salts as a fertilizer. It is pointed out that the salts should be used in highly diluted form, and to this end it is advisable to mix them in pulverized form with chemicals or barnyard manure in such quantities as to give 8.9 to 35.7 lbs. of manganese per acre.

Fish guano, L. M. DOUGLAS (*Natal Agr. Jour., 12 (1909), No. 2, pp. 166–168; Jour. Dept. Agr. West. Aust., 18 (1909), No. 4, pp. 314–316*).—A brief account is here given of the fish guano industry in the United Kingdom. The methods of manufacture and the character of the product are also described.

The agricultural utilization of city sewage, J. DANCKWERTS (*8. Internat. Landw. Kong. Wien, 3 (1907), Sect. V, Ref. 2b, pp. 29, figs. 2*).—In this article attention is called particularly to the fact that the fertilizing value of sewage depends to a very large extent upon the solid matter that it contains and to the desirability from an agricultural standpoint of preventing the dilution of the sewage with rain water. The paper also discusses at some length the most efficient means of handling and applying sewage water for agricultural purposes. It is pointed out that sewage will give best agricultural results if used in as fresh condition as possible. Some form of cooperative organization among farmers is essential to the efficient agricultural utilization of sewage.

Land utilization of sewage, E. G. MAWBEY (*8. Internat. Landw. Kong. Wien, 3 (1907), Sect. V, Rap. 2B, pp. 13*).—It is stated that "the trend at the present time in the British Isles is toward artificial treatment of sewage, chiefly by tanks and bacteria beds, because of the many instances where suitable land is not available, or the cost is entirely prohibitive, and because of some prejudice against sewage farms through mismanagement, etc.; also because artificial processes can be more uniformly controlled in all weathers."

The agricultural utilization of sewage, G. BECHMANN (*8. Internat. Landw. Kong. Wien, 3 (1907), Sect. V, Rep. 6b, pp. 9*).—The need of further study of methods of utilizing sewage in agriculture is especially emphasized in this article. Such use is to be recommended both for hygienic and for agricultural reasons. The newer biological processes, while giving hygienic results, yield such results with a loss of large amounts of valuable fertilizing material. It may be found advantageous to combine these methods with agricultural utilization.

The agricultural utilization of sewage (*8. Internat. Landw. Kong. Wien, 1 (1907), pp. 706–709*). Resolutions regarding this subject offered at the eighth international agricultural congress by G. Bechmann, J. Danckwerts, and R. Fischer are given. These resolutions summarize the principal points brought out in the papers noted above.

The transportation of garbage, J. Bénard (*Jour. Agr. Prat., n. ser., 17 (1909), No. 8, pp. 235, 236*). Various methods of transportation in use, particularly in Paris, and of handling garbage for fertilizer purposes are briefly noted.

The use of vinasse as a fertilizer, D. Libutti (*Istria Agr., 2 (1909), No. 4, pp. 77–89*).—It is stated that the average amounts of fertilizing constituents in vinasse which has been distilled and washed are as follows: Nitrogen 0.89 per cent, phosphoric acid 0.24 per cent, and potash 0.43 per cent. From these figures the author estimates its value as about $2.42 per ton without taking into consideration the beneficial effect that it would have on the physical condition of the soil. On account of the low proportion of phosphoric acid and potash, phosphates and potash salts should be used to supplement it. The vinasse can not be used as it comes from the press on account of its acidity and the slow decomposition of the stems and seeds. It is recommended, therefore, that it be composted for several months, being kept moist to hasten decomposition.

"Molascinder," H. C. Prinsen Geerligs (*Indische Mercuur, 32 (1909), No. 14, p. 250; abs. in Internat. Sugar Jour., 11 (1909), No. 121, pp. 3, 4; Chem. Abs., 3 (1909), No. 7, p. 817*).—A brief account is given of a new fertilizer which is made in Java and consists of a mixture of molasses, furnace ash, filter press mud, and well dried pen manure. An analysis is reported which shows this mixture to contain 0.42 per cent of nitrogen, 0.98 per cent of phosphoric acid, and 1.12 per cent of potash. The fertilizer is supposed to return to the soil all of the fertilizing constituents removed by sugar cane.

Molasses as a fertilizer, Ebbels and L. Fauque (*Jour. Fabric. Sucr., 50 (1909), No. 2, p. 1; Wchnschr. Brau. Ver. Rübenz. Indus. [Vienna], 47 (1909), No. 10, p. 144*).—Better yields of cane were obtained on soil to which molasses had been added. The soil so treated contained more nitrogen than similar soil which had not received molasses. It is suggested that the beneficial effect of the molasses was due to the promotion of the activity of nitrogen-fixing bacteria.

Report on fertilizers, B. B. Ross (*Bul. Agr. Dept. [Ala.], No. 25, pp. 112*).—This report contains analyses of fertilizers and cotton-seed meal inspected during the year ended July 31, 1908, as well as lists of fertilizer licenses issued, tags sold, and number and names of brands of fertilizers registered; the texts of the State fertilizer and cotton-seed meal laws with an explanation of their meaning; and a brief note on the soil survey work which is being done in cooperation with this Department.

[Analyses of fertilizers], R. E. Rose and L. Heimburger (*Fla. Quart. Bul. Agr. Dept., 19 (1909), No. 2, pp. 51–61, 65–79, 98–111*).—The results of inspection of fertilizers for the first quarter of 1909 are reported, with notes on the laws and regulations relating to the inspection, and on the sources, cost, valuation, and use of fertilizers.

Commercial fertilizers, W. J. Jones, Jr., et al. (*Indiana Sta. Bul. 133, pp. 503–587*).—This bulletin gives results of analyses of 902 samples of fertilizers inspected during 1908 with a summary of the Indiana fertilizer law and notes on its enforcement, estimated sales of different classes of fertilizers in the State, and a review of results of inspection for the seven years 1902 to 1908. It is estimated that 102,309 tons of fertilizer, valued at $2,457,406, was sold in Indiana in 1908.

Inspection of commercial fertilizers for the season of 1908, H. D. Haskins, L. S. Walker, and J. C. Reed (*Massachusetts Sta. Bul. 127, pp. 3–68*).—This is

a report on results of fertilizer inspection during the season of 1908, including also notes on methods of sampling, the essential constituents of fertilizers and the sources from which they are derived, trade values of fertilizing ingredients and valuation of fertilizers, and selection and purchase of fertilizers.

"A summary of results of inspection of complete fertilizers reveals the fact that out of the 282 distinct brands analyzed, 110 or about 39 per cent of the whole number fell below the manufacturer's guaranty in one or more elements. . . . The deficiencies in many of these brands were made up by an excess of some of the other elements so that only 17 out of the 284 brands analyzed showed a commercial shortage. . . . This certainly shows a much better condition than existed during the previous year."

Other fertilizing materials examined were generally of good quality.

Inspection and analyses of commercial fertilizers on sale in the State, W. F. HAND ET AL. (*Mississippi Sta. Circs. 27, pp. 3–27; 28, pp. 4–23; 29, pp. 4–29*).—The results of analyses of 254 samples inspected during the season of 1908–9 are reported.

Inspection of commercial fertilizers, P. F. TROWBRIDGE (*Missouri Sta. Bul. 82, pp. 3–30*).—This bulletin reports the results of analyses of 322 samples of fertilizers collected by State inspectors during September and October, 1908, with a brief discussion of the results and a statement of receipts and disbursements for the year 1908.

Analyses of fertilizers—fall season, 1908, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 30 (1909), No. 1, pp. 52*).—The analyses here reported are of samples collected by the fertilizer inspectors of the State department of agriculture during the fall of 1908. A list is given of brands of fertilizers registered for sale in 1909.

AGRICULTURAL BOTANY.

The colors and pigments of flowers with special reference to genetics, M. WHELDALE (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 545, pp. 44–60*).—A series of investigations on the color of flowers has been undertaken with a view to the interpretation of the phenomena in the inheritance of flower color. The author makes an attempt to classify roughly the pigments found in flowering plants and at the same time to determine whether there is any connection between the genetic behavior of the pigments and their chemical reactions. He classifies the pigments into those in solution in the cell sap and those associated with specialized protoplasmic bodies, the chromoplasts. The first group includes the soluble red, purple, and blue pigments known as anthocyanin and the soluble yellow pigments called xantheïn. The second group, which is insoluble in water, includes carotin, xanthin, etc.

About two dozen natural orders of plants were examined, and summarizing his results, the author states that anthocyanin includes several pigments differing as regards their inheritance, the colors to which they give rise in variation, and their behavior toward chemical reagents. The colors of the varieties arising from the anthocyanic type may be regarded as components of the original anthocyanin, and the type may be supposed to lose its components in succession, thus giving rise to color variations.

Broadly speaking, the author states that there are 2 series of color variations, one containing a xantheïc derivative and the other without any such derivative. Albinism in the first series is due to a lack of anthocyanin and xantheïn; in the second series to a deficiency in anthocyanin only. Xantheïn includes several different yellow pigments.

So far as the investigations have proceeded, there appears to be a correlation in genetics between the behavior of pigments and their relation toward chemical reagents.

In the case of plastid pigments, the type may contain carotin, xanthin, or both, and varieties arise in some cases from loss of power to produce carotin, or in others from loss of some of the constituents of xanthin. Anthocyanin may exist together with plastid pigments, in which case derivative products of both forms of pigmentation are found among the varieties.

Investigations on the etiolation of plants, G. KRÄNZLIN (*Ztschr. Pflanzenkrank., 18 (1908), No. 4, pp. 193–203, fig. 1*).—After giving a summary and criticism of Baur's investigations on infectious chlorosis (E. S. R., 18, p. 648), the author describes his studies on the distribution of coloring material in etiolated plants, particular attention being given to the presence of carotin and the different chlorophylls recently described by Tsvett (E. S. R., 20, p. 739).

Material of a number of variegated plants was studied, and in all the yellow leaves chlorophyllin was found present, the only difference in the green leaves being in the quantity of green coloring matter present. There appears to be no distinction between the coloring matters in plants affected with infectious and noninfectious chlorosis or with the different forms of etiolation.

The permeability of the coverings of the seeds of barley, A. J. BROWN (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 546; pp. 82–93, dgm. 1*).—The author states that the seeds of the variety of barley known as *Hordeum vulgare cærulescens* owe their color to the presence of a blue pigment in the aleurone cells. This pigment, like litmus, is turned red by acids. Such seeds, when immersed in a dilute solution of sulphuric acid, soon turn a pink color if their coverings are damaged, but if the integument is not injured they will imbibe water, become soft and swollen, and retain their color for a considerable time.

A study was made of the behavior of the seed coats, and the penetrating power of solutions of a number of chemicals was investigated. The investigations are considered as only preliminary, but the general trend of the evidence tends to show that solutions of the solutes which diffuse readily through the seed coverings differ in some essential manner from solutions of nondiffusible solutes. An explanation is offered in which it is stated that "some unrecognized peculiarity in the manner in which the molecules of the two classes of solutes are combined with the molecules of the solvent water may constitute the factor which orders their different behavior with respect to the seed coverings."

The origin of osmotic effects. II—Differential septs, H. E. ARMSTRONG (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 546, pp. 94–96*).—A discussion is given of the results described in the above paper, which are held to be extraordinarily significant as affording the means of dividing substances into two classes according to their diffusion through a membrane such as the outer covering of the seed of barley. The author says that "inasmuch as the barley grain contains but a small amount of soluble crystalloids, the absorption of water by the grain may be regarded as mainly conditioned by the extremely minute granules of starch inclosed within it; presumably these have great attraction for certain molecules in the liquid and become coated superficially therewith. From this point of view the method developed by Professor Brown involves the study of a struggle for hydrone between a mass of fine particles of solid and the solution of a substance present in the liquid state in solution in water."

The observations are believed to be the first of their kind.

The utilization of saccharose by certain plants, M. MOLLIARD (*Bul. Soc. Bot. France, 55 (1908), No. 8, pp. 636–639*).—In previous experiments (E. S. R., 19, p. 932) the author found that cress did not appear to grow well in solutions containing saccharose, although other cruciferous plants, especially radishes,

developed normally. In later experiments when grown in solutions containing 10 per cent saccharose, cress made no more growth than it did in cultures where 0.5 per cent glucose was added. When grown together in the same media, both radishes and cress made good growth. From this fact the author concludes that cress can take up only invert sugars through its roots. Radishes are able to take up saccharose and invert a considerable portion of the sugar, which could then be utilized by the cress.

Carbon dioxid transportation in leaves, K. Zijlstra (*Kohlensäuretransport in Blättern. Inaug. Diss., Univ. Groningen, 1909, pp. 128, pls. 2, figs. 3*).—By means of specially devised apparatus, the author studied the transportation of carbon dioxid through leaves. Portions of the leaves of a considerable number of species of plants were exposed to carbon dioxid while the other parts were kept in atmospheres free from that gas. Different illuminations were also given to parts of the leaves and the movement of starch traced.

In all cases it was possible to show a transportation of starch. In wheat it was carried for at least 2.5 cm., in Acorus 1.25 cm., in the dahlia 0.5 cm., and in the walnut, horse-chestnut, and linden leaves about 2 or 3 mm.

The temperature of respiring plants (*Gard. Chron., 3. ser., 45 (1909), No. 1161, p. 200*).—A review is given of some recent investigations by Peirce and Molisch on the temperature of respiring plants.

Peirce has recently shown (E. S. R., 20, p. 734) the value of Dewar flasks for use in determining the rising temperature due to the respiration of seeds, peas giving an increase of temperature from 17° C. to a maximum of 56° in 8 days.

In the experiments of Molisch cited, leaves of different trees were used, precautions being taken to prevent any loss of heat by radiation. It was found that the temperature within the mass of leaves rose rapidly, in the course of 12 to 15 hours the temperature of apple leaves rising to 59° C., hornbeam 51.5°, and linden 50.8°. The leaves of a number of other plants, particularly evergreens, gave less striking results.

In both experiments there is said to have been no question of any fermentation, the action being simply that of the normal respiration. In the experiments of Molisch, when the experiment was stopped before the highest temperatures were reached, the leaves upon examination were found to still be alive and fresh.

The respiration of plants at temperatures below zero, N. A. Maksimov (*Trav. Soc. Imp. Nat. St. Petersb., Sect. Bot., 37 (1908), III, No. 1, pp. 23–31, dgms. 2*).—The fluctuation of the respiration of pine needles, leaves of mistletoe, and buds of spiræa during the winter was investigated, and it was found that the respiration rose and fell with the temperature, but did not cease entirely at the lowest temperature observed, —20° C. With the falling of the temperature to zero, the respiration fell off very sharply. Between 0 and —12° the respiration of the pine was 1/25 and for spiræa 1/100.

Experiments in the freezing of plants, N. A. Maksimov (*Trav. Soc. Imp. Nat. St. Petersb., Sect. Bot., 37 (1908), III, No. 1, pp. 32–46, dgm. 1*).—Experiments were conducted with *Aspergillus niger* to determine the effect of increasing the osmotic pressure of the nutrient solution on the freezing of the mycelium.

It was found that the mycelium would freeze before there was any formation of ice either within the mycelium or in the nutrient solution. The death of the cells followed their cooling to the temperature of the surrounding medium, and this cooling is said to be a secondary cause of death. By increasing the concentration of the nutrient solutions through the addition of glucose or glycerin, the death of the cells due to cold was retarded but not wholly prevented. There did not appear to be any definite relationship between the lowering of the tem

perature of the nutrient solution and the temperature at which the mycelium became frozen. With the nutrient solution at −0.5°, the mycelium froze at 0°, while with the nutrient solution at −2.6° the mycelium was able to withstand a temperature of −10°.

The author claims that, so far as his experiments with Aspergillus go, the theory of Müller-Thurgau and Molisch that freezing depends on the formation of ice within the plant tissue, and consequently a dehydration of the cell plasma, does not hold.

Investigations on the effect of formaldehyde gas on green plants, V. GRAFE and L. VON PORTHEIM (*Österr. Bot. Ztschr., 59 (1909), Nos. 1, pp. 19–25; 2, pp. 66–74, fig. 1*).—Studies were made with seedlings and twigs of a number of plants placed under bell jars in atmospheres with and without formaldehyde gas and the effect of the gas on growth determined after an interval of from 7 to 16 days.

In the case of bean seedlings the hypocotyl and internodes were longer and better developed in the plants grown without formaldehyde gas, while the epicotyl and primordial leaves were longer and broader with those receiving the gas than in the normal or check lots. They also differed very considerably in shape. The roots of the beans were decidedly shorter and less developed than when grown under normal conditions.

The authors found that formaldehyde gas apparently stimulated an abnormal development in the primordial leaves. For those organs well supplied with chlorophyll, it appeared to induce greater development, but whether it was only a stimulus or was actually assimilated by the plants the authors were unable to determine. In small quantities formaldehyde gas does not appear to be injurious to green plants.

Experiments on the effect of flue dust on grass, E. HASELHOFF (*Landw. Vers. Stat., 69 (1908), No. 5–6, pp. 477–482*).—A study was made to determine the effect of the fumes from some blast furnaces and chemical works on grasses. Plats were sown to grass mixtures, and from December to February at intervals of 2 weeks the plats were dusted over with mixtures representing the flue dust from the different works, as shown by analyses. In addition to the flue dust plats were dusted with calcium sulphid, sodium sulphid, and sodium sulphate. Three cuttings of the grass were made during the season and 2 days after each cutting a dusting with the mixtures was again made to each plat.

The total dry weight of the grass for each plat is shown, and from this it is apparent that flue dust is injurious, especially to the second and third crops. Analyses of the ash are also reported which show a higher ash content and decided increases in the percentage of sulphuric acid present in the grass on the treated plats.

Apparatus and expedients in the bacteriological laboratory, S. DEM. GAGE (*Technol. Quart., 21 (1908), No. 4, pp. 508–521, figs. 7*).—Descriptions are given of various devices that are in use in the bacteriological laboratory under the author's direction, among them methods of cleaning apparatus and labeling media, apparatus for calibrating pipettes, automatic apparatus for filling dilution bottles, a case used for shipping samples of water for bacteriological analysis, a thermo-regulator, and incubators.

International catalogue of scientific literature. R—Bacteriology (*International Cat. Sci. Lit., 6 (1909), pp. VIII+1040*).—A list of over 9,000 titles to bacteriological literature is given, the arrangement being similar to that described in previous reports (E. S. R., 19, p. 427). The literature indexed is mostly that of 1906, although many earlier papers omitted in previous volumes are cited. The American literature still remains very inadequately represented.

FIELD CROPS.

Arid agriculture, B. C. Buffum ([*Worland, Wyo.*], *1909, pp. 443, figs. 61*).—This book discusses the approved agricultural methods practiced in the arid region of this country. The contents are devoted to a description of this region, to a consideration of dry farming, and to discussions on irrigation, crops and crop culture, crop destroyers, live stock, and home building in the arid sections.

Crop production in western Nebraska, W. P. Snyder and W. W. Burr (*Nebraska Sta. Bul. 109, pp. 5–55, figs. 15*).—This bulletin describes the substation farm at North Platte, discusses the climatic conditions of Nebraska and more especially of the western part of the State, presents the records of precipitation made at North Platte since 1875, reports the results of experiments in crop production, and considers the principles of cultivation entering into dry farming.

Four crops of winter wheat have been grown at the substation. In 1905 excessive rains caused such a rank growth on summer-tilled land that the crop lodged and was not harvested. A field of heavy sod plowed in June, 1905, and cultivated the remainder of the season gave an average yield of 42 bu. per acre, the range being from 31 to 45.7 bu. Five acres of new bench land broken in 1905 yielded 41 bu. per acre in 1906. In 1907 the test plats, aggregating 4½ acres of summer-tilled land, gave an average yield per acre of 59 bu., as compared with 24.4 bu. on table-land not summer tilled. This table-land field plowed and planted to corn did not yield over 5 bu. per acre, due to lack of moisture. In 1908, 8 acres of winter wheat in ½-acre plats on summer-tilled bench land gave an average yield of 57 bu. per acre, the highest yield being 66.9 bu. and the lowest 53 bu. The field of summer-tilled land producing 59 bu. per acre in 1907 was plowed in the fall and again sown to winter wheat, but the yield per acre in 1908 was only 20.86 bu. The marked influence of the lack of summer tillage was also shown on a 5-acre field of bench land, which produced 41 bu. per acre of winter wheat in 1906 and a crop of oats in 1907, yielded an average of only 29.6 bu. per acre in 1908. Of a number of new varieties tested only No. 1435, which came up to Turkey Red in yield, was retained for further trial. These tests, as well as others, indicate that Turkey Red and Kharkov are the best varieties for western Nebraska.

The average results of seeding experiments conducted with Turkey Red for 3 years and with Kharkov for 2 years show but little difference in yield from 2, 4, or 5 pk. of seed per acre. The average yield per acre was 54.84 bu. from 2 pk., 55.48 bu. from 4 pk., and 56.24 bu. from 5 pk. Experience has taught that it is advisable to sow winter wheat before September 15 in order to secure a sufficiently strong growth in the fall.

In work with spring wheats it was found that the durum varieties are likely to be more satisfactory than local varieties. In 1908 the yield of 4 durum wheats ranged from 30.3 to 32.5 bu. per acre, while 2 semihard local varieties gave 22.6 and 25.9 bu. This crop was grown on cornstalk ground double disked three times and seeded with a press drill at the rate of 5 pk. per acre. A comparison of four methods of preparing the seed bed for spring wheat in 1907 and 1908 resulted in the lowest average yield on spring-plowed wheat stubble, followed in the order of increasing yield by disked corn stubble, fall-plowed wheat stubble, and summer tillage alternating with wheat. The yields in 1907 varied from 24.5 to 31.8 bu. and in 1908 from 22.7 to 40.5 bu. per acre.

During 4 years' experiments with oats Kherson has given the best yields. In 1908 on fall-plowed land after winter wheat the yields per acre from the different varieties were as follows: Kherson 50.9 bu., Texas Red 40.7 bu., Black

American 40.9 bu., Red Algerian 27.2 bu., Burt 50.7 bu., and Swedish Select 34.4 bu. Sixty Day and Kherson are so similar that the authors class them together. Red Algerian and Swedish Select are late varieties and of little promise for the region. Kherson is recommended as the best oats for western Nebraska. Seeding 8 pk. of Kherson oats per acre was apparently better than using smaller quantities of seed. In 1908 oats on spring-plowed oats stubble yielded 34.4 bu., on disked corn stubble 43.5 bu., on fall-plowed oats stubble 68.5 bu., and on summer tillage alternating with oats 82.3 bu.

Under ordinary good methods of tillage barley yielded about 40 bu. per acre, but in 1906 on 8 acres of summer-tilled land 60 bu. per acre were secured. In 1908 a summer-tilled field of several acres on the table-land gave 67.7 bu. per acre. In the seeding tests 6 and 8 pk. of seed per acre gave the best results. Different methods of tillage previous to sowing the crop gave widely varying yields in 1907 and 1908.

Emmer introduced from Amarillo, Tex., and fall sown yielded at the rate of 64 bu. per acre, but the following year it winterkilled badly. Spring emmer sown at the rate of either 6 or 8 pk. per acre gave better yields than when 2 or 4 pk. were used for seed.

The average relative yields per acre of spring grains grown under the same conditions for 2 years were as follows: Kherson oats 1,741 lbs., common barley 2,256 lbs., hull-less barley 1,546 lbs., emmer 1,870 lbs., and Black Don wheat 1,780 lbs. Drilling barley, oats, emmer, and wheat in the spring of 1908 gave 10, 1.9, 6.4, and 9.6 bu. more per acre, respectively, than broadcasting. Listing corn has generally given better results than surface planting. Among the most satisfactory varieties of corn tested are Pride of the North, Minnesota No. 13, U. S. Selection 133, and early strains of Calico.

During four seasons the method of sowing sorghum broadcast has given better results than any other. In 1908 the use of 8 pk. of seed per acre gave the largest yield of forage. The highest yields of forage per acre recorded in experiments with different methods of planting conducted from 1905 to 1908 are as follows: Sorghum 6.47, milo maize 4.86, and Kafir corn 5.07 tons. The grain yield of sorghum in 1907 and 1908 in these tests ranged from 16.6 to 28 bu. per acre, and the yield of milo maize from 10 to 24 bu. The most satisfactory grass grown was brome grass, and observations to date indicate that it is the only grass capable of making a permanent sod on tilled land in western Nebraska. Alfalfa is considered the most profitable forage crop for valley land. Nebraska-grown seed seemed to be best.

Methods of tillage and dry farming, G. SEVERANCE (*Washington Sta. Popular Bul. 15, pp. 7, figs. 5*).—The methods of tillage for dry farming are discussed and the implements used in this connection are described and illustrated. The essential features of the methods outlined include the maintenance of the humus by working into the soil all the straw and stubble available, disking the stubble before the beginning of the winter rains, preparing a dust mulch of 2 to 4 in. as soon as possible in the spring, following the plow immediately with a subsurface packer, and keeping the fallow clean and mulched with a knife weeder.

A test of these methods showed that the land could be kept clean without drifting of the soil, that 30 bu. per acre of winter wheat is a possible yield, that crops on the fallow preceding wheat often cause the wheat crop to be a failure, and that weeds such as Russian thistle may dry out the soil to such an extent that a timely germination of the wheat is prevented.

Dry farming in Wyoming, J. D. TOWAR (*Wyoming Sta. Bul. 80, pp. 3–29, figs. 31*). This bulletin summarizes the replies received in answer to a list of questions sent out by the station to parties engaged in dry farming in different parts of the State.

These replies show that dry farming has been practiced by these parties 9 years on an average, the time ranging from 1 to 25 years, and that the average farm is 109 acres, with the range from 10 to 800 acres. The greatest number favor a farm of 320 acres, but the average of the replies puts the area at 272 acres. The average rainfall as based on estimates and measurements given in the reports is 13.2 in., the range being from 7 to 20 in. Practically all the rain falls from May 1 to July 31. The following yields are reported: Wheat 21.65 bu., oats 33.7 bu., barley 28.83 bu., rye 20.66 bu., spelt 30 bu., Indian corn 19.2 bu., potatoes 110 bu., alfalfa hay 1.25 tons, timothy hay 1.5 tons, and rye hay 2.25 tons per acre.

Most replies give fall plowing the preference over spring plowing, and seeding with the press drill is advocated. While many of these parties crop the land every year the consensus of opinion is in favor of using the moisture of 2 years for 1 crop.

Extracts and quotations from an article by W. S. Palmer on some climatic features of the State and their relation to dry farming are also given in the bulletin and the principles of dry farming are briefly discussed.

Irrigation experiments at Bromberg, Gerlach and Krüger (*Jahrb. Deut. Landw. Gesell., 23 (1908), No. 4, pp. 664–675*).—The results of one series of tests conducted for 3 years showed that irrigation gave satisfactory returns only when the soil had been sufficiently fertilized. Much less water was required in the production of a kilogram of dry matter in corn and oats on fertilized than on unfertilized plats.

An irrigation test with fodder beets showed that by the use of 200 mm. of water before July 28 and of 100 mm. after that date, the yields of beets, sugar, and dry matter on unfertilized soil were reduced 29, 28, and 31 per cent, respectively, as compared with the unirrigated check plat, but that when 100 mm. of water was used before and 200 mm. after July 28, the reductions were only 7, 6, and 16 per cent, respectively. On a fertilized plat receiving 200 mm. of water before and 100 mm. after July 28, the yield of beets as compared with the check plat was reduced only 1 per cent and the yield of dry matter only 4 per cent, while the yield of sugar showed an increase of 4 per cent. On the fertilized plat which received 100 mm. of water before and 200 mm. after July 28 the beets gave an increase of 10 per cent, the sugar of 17 per cent, and the dry matter of 9 per cent.

The use of water ranging from 5 to 12° C. in the irrigation of barley showed that the water lowest in temperature had been a little more effective in increasing the yield than warmer water.

The irrigation of oats with different quantities of water applied in different ways resulted in a marked increase in yield in every instance. Applying the water by sprinkling gave much more favorable results than furrow irrigation, while flooding proved least satisfactory. In 1908, which was a comparatively dry year, the use of the same quantity of water given in numerous small applications did not seem to have an advantage over the use of larger applications at longer intervals, but in 1907, a year of greater rainfall, numerous small applications gave the more favorable results. Increasing the application of water from 140 mm. to 280 mm. gave only slight gains, and the use of only 70 mm. produced only an unimportant increase. The weight of the individual grains, as well as the bushel weight, was greater with the irrigated oats than in the case of the crop grown without irrigation, but the different methods of applying water remained without effect in this regard. In the two tests in 1908, in which the water had been used to the greatest advantage, sprinkling required 506 liters of water to produce 1 kg. of dry matter and furrow irrigation 825 liters, while in 1907 the quantities of water so required were 698 liters and 1,052 liters,

respectively. When precipitation and irrigation are both taken into account a kilogram of dry matter in the crop of 1908 required 467 liters of water applied by sprinkling and 581 liters under furrow irrigation.

The influence of mineral fertilizers on certain Cyperaceæ, J. B. Gizz (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 11, pp. 727–729; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 13, p. 411*).—In the experiments reported it was found that the leaves of *Carex riparia* and *C. stricta* were greatly increased in length and size by the use of liberal applications of nitrogenous fertilizers. Phosphatic and potash fertilizers, on the other hand, produced no marked effect on the yield. The author concludes that the merchantable quality of sedges can be greatly increased by the proper use of nitrogenous fertilizers.

Report of the committee on breeding cereals, L. S. Klinck et al. (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 44–65*).—This report outlines promising lines of investigation in cereal breeding, describes the progress made in wheat, barley, oat, and rice breeding, and summarizes briefly the work in these lines by the experiment stations in this country and Canada.

Seed grain, A. Boss et al. (*Minnesota Sta. Bul. 115, pp. 363–384, figs. 2*).—The seed of grain is described with reference to its parts, germination, and growth. Directions for cleaning and grading grain are given, together with notes on the grain smuts and their prevention and the results of variety tests made by the station.

Minnesota No. 169, Hayne Blue Stem and Bolton Blue Stem have been found superior to the common blue stem wheats and Minnesota No. 163 has shown itself to be a superior Fife wheat. Manshury barley is mentioned as the best for Minnesota soils and Minnesota No. 105 developed from Manshury is also given as a standard variety. The following are considered the leading varieties of oats: White Russian, Silver Mine, Swedish Select, Minnesota No. 6, and Minnesota No. 26. The best variety of flax tested at the station is Minnesota No. 25.

With reference to yields it is stated that the blue stem wheats seem to be more productive than the Fife varieties. Minnesota No. 169 has a record of 26.7 bu. and Minnesota No. 163 of 26.4 bu. per acre for the past 14 years. Where from 18 to 20 bu. or more of blue stem or Fife wheat can be produced it is believed that no increased profit will result from growing durum varieties. Among the varieties of oats Minnesota No. 6 has averaged 60 bu. per acre and Minnesota No. 26, 66.6 bu. for the last 15 years. In 1908, 41 varieties of six-rowed barley yielded at the rate of 44 bu. and 23 varieties of two-rowed barley at the rate of 31.5 bu. per acre. Minnesota No. 105 has averaged 50.4 bu. per acre for the past 10 years.

Variety testing, C. A. Mooers (*Tennessee Sta. Bul. 86, pp. 76–81; Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 48–53; 54, 55*).—The results of cooperative variety tests with corn and potatoes are reported in tables.

Hickory King corn proved to be the best for poor soils and Leaming and Iowa Silver Mine appeared especially well suited to the Cumberland Plateau. Boone County White, Huffman, Webb Improved Watson, and the ensilage varieties Albemarle Prolific and Cocke Prolofic are adapted only to rich soils. It is stated that Hickory King should be so planted that an acre grows at least 1,000 stalks more than it ordinarily does of Huffman.

With potatoes, the use of a complete fertilizer gave a high percentage of increase in the yield. The best yield, 360 bu. per acre, was secured with Bliss Triumph grown from Southern seed and fertilized with 300 lbs. of acid phosphate, 50 lbs. of muriate of potash, 400 lbs. of cotton-seed meal, and 12 tons of barnyard manure per acre. Northern seed of this variety under the same conditions yielded per acre only 262 bu.

Alfa and alfa paper, H. DE MONTESSUS DE BALLORE (*Alfa et Papier D'Alfa. Paris, 1909, pp. 69, pls. 8, figs. 20, map 1*).—The habitat and value of alfa are described and the process of manufacturing paper from the plant is discussed in detail. Two species, *Lygeum spartum* and *Stipa tenacissima*, are considered, the one of greatest economic importance being the latter, which is the true alfa. The volume is printed on paper made from alfa.

[Astragalus falcatus], J. FABRE and D. VIDAL (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 13, pp. 387–393*).—Experiments showed that on soils well adapted to alfalfa *A. falcatus* is incapable of replacing it, but that it is of special value for poor and dry soils where alfalfa can not be grown with profit. It was also observed that on soil rich in lime Astragalus made a poor growth.

Alfalfa seed in Oklahoma, L. A. MOORHOUSE and W. L. BURLISON (*Oklahoma Sta. Bul. 83, pp. 3–23, figs. 25*).—Methods of testing alfalfa seed are described and the results of 42 samples analyzed are given in tables and briefly noted. The samples are grouped as follows: High in purity with medium germination; low in purity with satisfactory germination; low in purity with good vitality; and low in purity with low germination.

Of 400 samples examined by the station not more than 20 were high in purity and at the same time vigorous in germination. A list of weed seeds found in alfalfa seed is given and the more important species are described. *Setaria glauca*, *S. viridis*, *Plantago lanceolata*, *Panicum sanguinale*, *Chenopodium album*, *Amaranthus hybridus*, *Panicum capillare*, and *Centaurea piciris*, given in decreasing order of importance, were most common in the samples of alfalfa seed examined.

Clovers and alfalfa, C. A. MOOERS (*Tennessee Sta. Bul. 86, pp. 82, 83; Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 54, 55*).—A general discussion of tests with these crops is presented.

Alsike clover gave decidedly the best results when the soil was treated with 12 tons per acre of barnyard manure. Crimson colver as a winter cover crop gave fair results when sown into corn at the last cultivation. As indicated by observation and experiments, alfalfa can be grown successfully anywhere in Tennessee provided the soil has been inoculated and the land is in a high state of fertility and free from certain weeds. From 24 to 30 lbs. of alfalfa seed per acre is recommended.

Experiments in the growth of clover on farms where it once grew but now fails, J. H. SQUIRES (*New York Cornell Sta. Bul. 264, pp. 347–364, figs. 9*).—The possible reasons for failure of clover are discussed and the results of experiments in different parts of the State to ascertain what treatment would make clover growing profitable are reported. In these experiments lime, manure, and commercial fertilizers were used and the soil was inoculated as means to restore the clover-growing ability of the land.

The first test on well-drained valley loam showed that the use of 1,500 lbs. of lime per acre exerted a marked influence. The average yield of hay from mammoth clover on the unlimed plats was at the rate of 2,178 lbs. per acre as compared with 4,343 lbs. on the limed plats. The manure applied at the rate of 15 tons per acre also produced very beneficial effects, while little benefit was derived from any of the commercial fertilizers. In general the best results were secured from applying manure and lime together and growing alsike or medium red clover.

The second series of tests was made on a light brown or yellow silt loam with a yellowish or grayish subsoil. The treatment was the same as in the first test, but the plats were not inoculated and were seeded with oats. The unlimed plats in this case yielded 1,134 lbs. of hay per acre and the limed

1,843 lbs. The manure was not so effective as in the other work. Alsike and medium clover again gave better yields than mammoth. Sorrel, daisies, and redtop were the chief plants growing with the clover. The untreated plats contained approximately 76.5 per cent of grass, 1.5 per cent of clover, and 22 per cent of weeds, and the limed 88 per cent of grass, 8 per cent of clover, and 4 per cent of weeds. The lime and muriate of potash plats contained 13 per cent of clover, and the lime and complete fertilizer plats 10 per cent.

The results of pot experiments with the silt loam soil were in the aggregate the same as those obtained in the field. They indicated the need of lime with either manure or fertilizers. The greatest gain, which amounted to 71 per cent, was secured with a complete fertilizer applied with lime. Nitrate of soda applied with acid phosphate gave good results, but muriate of potash either with or without lime was used without effect. An experiment with this same soil conducted by the wire-basket method also showed the importance of manure and pointed out the greater need of nitrogen and of phosphatic fertilizers than of potash.

Notes are given on lime and its use and a plan to conduct cooperative experiments in the growth of clover is presented.

Report on the propagation of resistant clover. S. M. Bain (*Tennessee Sta., Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 65–67*).—This report reviews the work done by the station in the propagation of strains of clover resistant to anthracnose (*Colletotrichum trifolii*) and reaffirms the statements made in a previous bulletin (E. S. R., 18, p. 843). Advice as to how to guard against the disease is also given.

Clover-seed production in the Willamette Valley, Oregon. B. Hunter (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 28, pp. 15, figs. 2*).—This circular describes the methods used in the production of clover seed in this region. The types of soil, the yield of seed, means of securing a stand, rotations, pasturing, and clipping, the use of land plaster, and the manner of harvesting the clover crop for seed are discussed.

Corn. M. L. Bowman and B. W. Crossley (*Des Moines, Iowa, 1908, pp. 472, pls. 11, figs. 193, dgms. 6, charts 18, maps 4*).—The discussions presented in this book cover the various phases of corn growing, judging, breeding, feeding, and marketing. The introductory chapter is devoted to the history of the corn plant, and among the 21 succeeding chapters may be mentioned those devoted to climate and soil in relation to corn, seed corn, corn cultivation, harvesting and storing, cost of growing, marketing, commercial products of corn, composition and feeding value, corn silage, and judging corn. The last 3 chapters treat of corn breeding.

The effect of selection upon certain physical characters in the corn plant. L. H. Smith (*Illinois Sta. Bul. 133, pp. 51–67, figs. 11*).—This bulletin reports the results secured in selecting corn plants with a view to influencing the height at which the ear is borne on the stalk and the position of the ear with reference to its declination from the stalk at maturity.

In 1902, two sets of ears of Leaming corn, the one representing ears growing high on the stalk and the other those borne low down on the plant, were selected. The following year each set was planted in a breeding plat, and the selection for high and low ears continued each year. The results of this work are summarized in the following table:

General averages of crops produced in corn breeding for high ears and for low ears.

Year.	Height of ear (inches).		Height of plant (inches).		Number of internodes below ear.		Total number internodes of stalk.	
	High-ear plat.	Low-ear plat.	High-ear plat.	Low-ear plat.	High-ear plat.	Low-ear plat.	High-ear plat.	Low-ear plat.
1903	56.4	42.8	113.9	102.5	8.5	7.2	15.4	13.9
1904	50.3	38.3	106.2	97.4	7.5	6.2	14.5	13.0
1905	63.3	41.6	128.4	106.5	8.2	6.5	15.4	13.6
1906	56.6	25.5	116.3	86.0	9.0	5.9	15.1	11.0
1907	72.4	33.2	130.4	99.7	9.2	5.8	16.3	13.0
1908	57.3	23.1	114.0	79.3	8.2	4.7	15.5	11.5

The results show that two strains of corn have been produced, one of which bears the ears about 3 ft. higher on the stalk than the other. The high-ear strain has longer stalks, longer internodes, a greater total number of internodes, and a greater number of internodes below the ear than the low-ear strain. "Perhaps the most significant of all as throwing light upon broader problems of heredity is the fact brought out by these results that the corn has not only responded to the selection, but there has been a gradual progressive shifting of the types so that even in the fourth generation the average height of ears in the one strain is more than twice that in the other." The smaller type of plant, or the low-ear strain, has a shorter growing period than the high-ear strain. In yield of grain no great difference is indicated, but the high-ear strain produces the greater yield of fodder.

The experiments to influence the declination of ears were begun in 1903, and the selections were made according to the angle of declination at harvest time from "Illinois High Oil" corn, a strain under selection for 7 generations for increase in oil content. The results of this experiment are brought together in the following table:

Average declination of ears from the perpendicular in breeding for erect ears and for declining ears.

Year.	Average of seed.			Average of crop.		
	Erect-ear strain.	Declining-ear strain.	Difference between strains.	Erect-ear strain.	Declining-ear strain.	Difference between strains.
	Degrees.	*Degrees.*	*Degrees.*	*Degrees.*	*Degrees.*	*Degrees.*
1904	20.0	180.0	160.0	42.0	45.0	3.0
1905	16.7	180.0	163.3	62.2	117.1	54.9
1906	15.0	180.0	165.0	49.5	76.2	26.7
1907	12.8	180.0	167.2	42.3	81.6	39.3
1908	7.2	176.0	168.8	46.0	88.5	42.5

The results show that the declination of the ear is a character that can be influenced by breeding. The length of shank is apparently the principal factor in determining the declination. The declining ear is the better protected from rain and is harvested by hand with greater facility.

Report of the committee on breeding cotton, H. J. Webber et al. (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 215–219*). This paper consists largely of a report on hybrids and selections of cotton. The work here summarized consists of straight selections, crossing big-bolled with small-bolled, big bolled with big-bolled, and long-staple upland with short-staple upland cottons, and making

hybrids between upland short and long staples and Sea Island and Egyptian varieties.

Report of committee on breeding fiber crops, J. H. SHEPPERD ET AL. (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 219–233, figs. 7*). This report consists of the following papers: A Survey of the Conditions Surrounding Fiber-Crop Production, by L. H. Dewey; Hemp and Hemp Breeding, by F. Knorr; Breeding Fiber Flax for Resistance to Diseases, by H. L. Bolley; and Breeding Flax for Fiber Type of Plant, by J. H. Shepperd.

Fiber experiments, G. A. GAMMIE (*Dept. Agr. Bombay, Ann. Rpt. Expt. Work Ganeshkhind Bot. Sta. 1907–8, pp. 16–33*).—In 1906, jute yielded in an experimental culture at the rate of 609 lbs. of dry fiber per acre, the percentage of fiber to stalk being 2.45. In 1907 an acre yield of 817 lbs. of dry fiber was secured and the percentage of fiber to stalk reached 4.72. The two species of jute to which attention is given are *Corchorus capsularis* and *C. olitorius*. Brief notes on work with other fiber crops are also presented.

The results of experiments with a large list of cotton species and varieties are shown in a table and the behavior of several kinds is briefly noted.

Improvement of hops by selection and breeding, W. W. STOCKBERGER (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 156–161*).—This paper points out the need for improvement and the failure of introduced varieties, describes improvement by selection and hybridization, and discusses the correlation of characters in the hop and the importance of breeding in hop culture.

Experiments on the absorption and excretion of plant food by oats at different stages of growth, L. SEIDLER and A. STUTZER (*Jour. Landw., 56 (1908), No. 3, pp. 273–278; abs. in Chem. Abs., 3 (1909), No. 6, p. 683*).—Pot experiments with oats harvested at four different periods showed that the starch content was at the maximum during the last period while the amount of nitrogen, potash, soda, phosphoric acid, and lime was greater before maturity. These results corroborate those of other investigators, and indicate that after the plant food, especially potash, has performed its functions in the plant it is returned in part to the soil.

Peanuts, W. R. BEATTIE (*U. S. Dept. Agr., Farmers' Bul. 356, pp. 40, figs. 20*).—This farmers' bulletin, which supersedes Farmers' Bul. 25 (E. S. R., 6, p. 803), discusses the soil and climatic requirements of the peanut and gives general directions for its culture. The topics treated are soil preparation, fertilizers, rotation, seed and its selection, planting, cultivation, harvesting and picking and cleaning. The varieties and uses of peanuts are described and the importance of the peanut as a farm crop is pointed out. Notes on insects and diseases attacking the plant are also given.

Irish potato investigations, C. P. CLOSE and T. H. WHITE (*Maryland Sta. Bul. 132, pp. 151–173, figs. 7*).—The results of culture, seed, and variety experiments with potatoes are reported and directions for growing the crop are given.

Experiments to determine the relative merits of shallow, medium, and deep cultivation at intervals of 5, 10, or 15 days showed the best yields from deep and infrequent cultivation. There was a difference of over 14 bu. per acre in favor of deep over shallow cultivation and of 21 bu. in favor of infrequent working. Different kinds of seed potatoes ranked in the following order of yield: Maryland second crop, Maine grown, Virginia second crop, and home-grown summer-harvested seed. The results of one test with seed potatoes kept in cold storage indicate that apparently cold storage has little advantage over ordinary storage for early spring planting. Of 2 varieties grown in 1907 and 3 in 1908, seed with strong sprouts gave an average yield per acre of 126 bu. of prime tubers and 54.1 bu. of culls, while seed with weak sprouts produced

37.6 bu. of prime tubers and 36.8 bu. of culls. Fall-harvested seed gave better results than summer-harvested tubers.

A comparison of different sized tubers of summer and fall-harvested seed crops graded into egg, walnut, and marble size, showed that the egg size produced the best yield, being followed by the walnut and the marble size in the order mentioned. The seed end surpassed the stem end in Maine grown seed by 22 bu. and 19 bu. per acre for Early Rose and Sir Walter Raleigh, respectively. In the case of home-grown seed the corresponding figures were 44 bu. and 24 bu. per acre.

A test is reported of 27 American varieties of northern seed, 17 varieties of French, and 8 varieties of German seed planted in 1905. To these were added 21 varieties in 1906. The results showed the following varieties as leading in yield: Early varieties, Irish Cobbler, Noroton Beauty, Clark Pride, Early Ohio, and Early Six Weeks; medium-maturing varieties, Green Mountain, Rural New Yorker, Planet, Sir Walter Raleigh, Early Thoroughbred, Early Reliance, Pat's Choice, Montana Prizetaker, White Elephant, State of Maine, Six Weeks, Manistee, and Early Rose; late varieties, Blue Peerless, Blush, Clinton, Canada, Pride of America, McCormick, Oom Paul, Agnelli, and Banner.

Potato experiments and studies, A. R. KOHLER (*Minnesota Sta. Bul. 114, pp. 287–333, figs. 2*).—About 110 varieties of potatoes, including varieties and species from Mexico, South America, and Europe, were on trial at University Farm in 1908. The results secured are tabulated and descriptions and notes are given on 63 of the more important varieties. A tentative classification of varieties into eleven groups is presented.

In total yield in 1908 Factor led with 205.3 bu. per acre, being followed by Freeman with 203.7 bu. In yield of marketable potatoes Freeman stood first with 193.5 bu. per acre and Factor next with 168.1 bu. Among varieties tested 3 years or more since 1900, Bartlett stood first in average rank, Acme second, and White Beauty third.

In a comparison of old and new seed stock of 7 varieties, made in 1908, the results with the new stock ranged from a loss of 7.5 bu. of marketable tubers per acre to a gain of 105.1 bu. with an average gain of 45.1 bu. With only one exception the tubers of the new stock were larger than those of the old stock. The amount, uniformity, and density of growth of the plants was also in favor of the new stock. The foliage of the plants from the new stock remained green longer in most cases than that of the old stock plants.

An experiment with different quantities of seed per acre (ranging from 5 to 60 bu.) showed that the use of 11 bu. was the most profitable. The use of badly diseased tubers for seed reduced the yield quite extensively and planting even slightly diseased tubers resulted in a loss. In 1908 the increase in the yield of marketable potatoes per acre as apparently due to spraying with Bordeaux mixture was as follows: Spraying 6 times 18.7 bu., spraying 4 times 15.8 bu., spraying 3 times 8.4 bu., while spraying 2 times gave a slight loss.

Potato growing for Minnesota, A. R. KOHLER (*Minnesota Sta. Bul. 114, pp. 334–362, figs. 4*).—This article is a brief treatise on the culture of the potato in Minnesota. Potato crop statistics and methods for the control of the potato beetle and of the diseases which attack the plant are given in addition to cultural directions and suggestions for keeping up the seed stock.

Experiments with potatoes 1906–1908, W. BRUCE (*Edinb. and East of Scot. Col. Agr. Bul. 17, pp. 24*).—Among the best varieties of potatoes grown were Midlothian Early, Sharpe Express Conquest, Cottar, Dalmeny Acme, Factor, Dalhousie, What's Wanted, and Langworthy. The two varieties last mentioned

ranked highest in quality but did not come up to the others in yield. Sets obtained by cutting tubers of market size produced as heavy crops as whole tubers of small size, and furnished a larger proportion of marketable potatoes. Planting 12 in. apart in the row gave better results than planting at wider distances.

Lime nitrogen proved an efficient nitrogenous fertilizer for the crop. The use of 1 cwt. of sulphate of ammonia, 4 cwt. of superphosphate, and 1 cwt. of potash per acre is recommended, either used alone or with a heavy dressing of barnyard manure. The use of 5 cwt. of ground lime per acre in connection with a complete fertilizer was not profitable, and the corresponding use of 1 cwt. of carbonate of magnesia has so far not given results that would warrant its general use.

Summary of experiments on the manuring of potatoes in Lancashire, E. Porter and R. C. Gaut (*County Council Lancaster, Ed. Com., Agr. Dept., Farmer's Bul. 13, pp. 25, pl. 1*).—Basing their recommendations on the results of the experiments here described, the authors advise the use of 20 tons of barnyard manure per acre for potatoes on land in moderately good condition. Where commercial fertilizers are to be used alone 2.5 cwt. of sulphate of ammonia, 6 cwt. of superphosphate, and 2 cwt. of muriate of potash is recommended. Satisfactory crops of potatoes were grown with the use of commercial fertilizers alone, but the practice is not considered generally good. For the production of the largest and most profitable crops it is advised that 10 tons of barnyard manure, 1 cwt. of sulphate of ammonia, 4 cwt. of superphosphate, and 1 cwt. of muriate of potash per acre be given.

The composition of the sugar beet in the past, present, and future, H. Briem (*Osterr. Ungar. Ztschr. Zuckerindus. u. Landw., 38 (1909), No. 1, pp. 32–44*).—This article points out the increase in sugar content and the greater yields of sugar secured from the earlier periods of sugar-beet culture to the present day, and discusses the possible improvement of the sugar beet in the future. A list of 13 references to literature on the subject is given.

The sugar beet, L. Malpeaux (*La Betterave à Sucre. Paris, 1908, pp. XII+128, figs. 57*).—This book is divided into 3 parts, the first being devoted to a discussion of sugar-beet culture both for the manufacture of sugar and the production of seed. The second part treats of beets grown for distillery purposes, and the third briefly considers the culture of chicory.

Report of the committee on breeding forage crops (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 269–294, figs. 13*).—This report consists of a paper on The Improvement of Timothy, by T. F. Hunt, and one on Some Preliminary Observations Concerning the Improvement of Timothy, by H. A. Allard.

Report of committee on breeding tobacco, A. D. Shamel (*Amer. Breeders' Assoc. Proc., 4 (1908), pp. 245–258*).—This report submits the following papers: Tobacco Breeding in the Connecticut Valley, by J. B. Stewart; Report on the Improvement of Ohio Filler Tobacco, by A. D. Selby; and Report on Tobacco Breeding Work in Kentucky and Tennessee for 1907, by W. H. Scherffius.

HORTICULTURE.

Suggestions from a survey of the trucking region of eastern Long Island, B. H. Crocheron (*New York Cornell Sta. Circ. 5, pp. 5–12, fig. 1*).—The author made a survey of agricultural conditions in the trucking section of eastern Long Island in 1908–9. The complete data secured is to be reported later in bulletin form. This circular contains some notes and suggestions based on the survey relative to crop systems and economic phases of trucking, fertilization, insect pests, and plant diseases.

Celery, C. C. Newman (*South Carolina Sta. Bul. 144, pp. 5–24, figs. 9*).—This is a popular discussion of celery culture taking up soils, fertilizers, nursery

and planting practices, cultivation, methods of blanching, gathering, shipping and varieties.

Onion culture, W. R. BEATTIE (*U. S. Dept. Agr., Farmers' Bul. 354, pp. 36, figs. 20*).—In this Farmers' Bulletin which supersedes Farmers' Bul. 39 (E. S.R., 8, p. 224) information is given relative to areas, climate, and soils adapted to onion culture together with an account of modern cultural practices, harvesting, curing, storage, marketing, important commercial varieties of onions, and onion diseases and insect pests. The history and characteristic features of the Bermuda onion industry in the Gulf Coast States is also given. Inasmuch as the production of onion seed and sets is limited to certain localities and conditions, these subjects are not discussed.

The influence of manganese on the growth of pineapples, W. P. KELLEY (*Hawaii Sta. Press Bul. 23, pp. 14*).—This is a preliminary report on an extended investigation being conducted by the station to determine why pineapples do not grow successfully on certain types of soil which sometimes occur in pineapple fields. The work and conclusions thus far reached are summarized as follows:

"Some of the pineapple soils of Hawaii contain black spots on which pineapples do not grow successfully.

"The application of fertilizers and lime in conjunction with good tillage and drainage has not resulted in effectually overcoming the yellow appearance of the pines on black soil.

"The black soils contain less acidity than the red soils.

"There is but one important difference in the chemical composition of these soils, viz, in regard to the manganese content. The black soil contains many times as much manganese as the red soil.

"The black color of these areas may in part be attributed to the presence of higher oxids of manganese.

"There is a close correlation between the degree of yellowing of the pines and the percentage of manganese in the soil.

"Yellow pines from soils containing a high percentage of manganese are more active oxidizing agents than green plants from red soil.

"The yellow pines have a poor root system and contain but little chlorophyll.

"As yet no positive remedy for this condition has been worked out. It seems wise to try other crops on the black soil, especially since sugar cane grows well on the black soil."

Strawberry growing in Colorado, B. O. LONGYEAR (*Colorado Sta. Bul. 140, pp. 3–12*).—This bulletin discusses cultural methods practiced by commercial strawberry growers in Colorado, the following phases being considered: Soils, location, preparation of land, fertilizers, planting operations, cultivation and irrigation, mulching, picking, packing, marketing, renewal of old beds, rotation, growing a second crop in one season, varieties, cost of growing, yields and profits, insects and diseases.

The rôle of hybridization in the reconstruction of vineyards, P. GERVAIS and L. WEIGERT (*8. Internat. Landw. Kong. Wien, 4 (1907), Sect. X, Rap. 1, pp. 17; Ref. 1, pp. 6*).—This consists of 2 papers on the above subject presented by the authors respectively before the Eighth International Congress of Agriculture at Vienna in 1907.

Anatomical studies of the union between stock and scion in grafted grapes, G. DE ISTVÁNFFI (*8. Internat. Landw. Kong. Wien, 4 (1907), Sect. X, Rap. 4, pp. 8*).—A résumé of the author's investigations along this line presented before the Eighth International Congress of Agriculture at Vienna in 1907.

The influence of pinching fruit-bearing shoots of the vine on the sugar content of the grape, G. Rivière and G. Bailhache (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 18, pp. 541, 542*).—In a previous investigation (E. S. R., 19, p. 844) with the Chasselas Doré grape it was found that the sugar content of the grape decreased approximately in proportion to whether 4, 3, 2, 1 or no leaves were left on the shoot beyond the bunches, two bunches being left on each shoot. The work was continued with the same variety to determine whether the sugar content continues to increase when more than 4 leaves are left. The sugar content was found to increase continually from 159 gm. per liter of must where no leaves were left beyond the bunches to 205 gm. where 5 leaves were left. No further increase was obtained when 6 or 7 leaves were left. Similar results were found for the acid content which decreased from an amount corresponding to 3.95 gm. sulphuric acid per liter where no leaves were left to 3.65 gm. where 5 leaves were left. As a result of this work it is recommended that in pinching back the bearing shoots 5 leaves should be left beyond the second bunch.

The setting of muscat of Alexandria grape, T. Lunt (*Gard. Chron., 3. ser., 45 (1909), No. 1168, pp. 306, 307*).—The author gives brief practical directions based upon his experience for several years relative to the greenhouse treatment of muscat of Alexandria grapes. The points discussed include ventilation, shading, watering, thinning, and pollination.

Viticulture in the coastal region of Argentina, J. F. Baldassarre (*Bol. Min. Agr. [Buenos Aires], 9 (1908), No. 5–6, pp. 276–334, figs. 18*).—With the view of stimulating the grape industry in the coastal provinces of Argentina, a detailed account is given of the cultural methods used and varieties grown in a successful grape vineyard of that section.

Pruning mature fruit trees, O. B. Whipple (*Colorado Sta. Bul. 139, pp. 3–20, figs. 15*).—This bulletin, which is supplementary to a previous bulletin of the station on pruning fruit trees (E. S. R., 17, p. 864), contains discussions on the physiology of pruning, treatment of wounds, and pruning tools, together with suggestions for pruning as applied to the apple, apricot, cherry, peach, pear, plum, and quince. Suggestions are also given for thinning apples, pears, and peaches.

On the chemical composition of fruits from wall-grown trees as compared with that of fruits of the same variety from trees grown on trellises, G. Rivière and G. Bailhache (*Jour. Soc. Nat. Hort. France, 4. ser., 10 (1909), Apr., pp. 236, 237*).—Analyses were made of Calville Blanche apples from trees grown as double vertical cordons on a southern wall, and from trees grown as horizontal cordons on a trellis directed east and west. The fruits gathered from the wall-grown trees contained a considerably larger amount of sugar in the juice than the fruits gathered from the trellis-grown trees. Likewise the acid content of the fruit from the latter trees is greater than that of the fruit from the wall-grown trees. Further experiments are to be conducted to determine the requisite amount of heat necessary for the best development of the sugar content in this variety of apple.

Orcharding (*Mass. [Bd.] Agr. Bul. 2, pp. 136, figs. 16*).—This is a compilation of the following articles on fruit culture which have previously appeared in different years in Agriculture of Massachusetts: The Relation of Fruit Culture to the Value of New England Farms, and The Soil Importance of its Character for the Culture of Fruit, by G. T. Powell; Fruits for Local Markets, by J. H. Hale; The Planting of a Commercial Orchard in Massachusetts, and Renovating Old Orchards, by F. C. Sears; Harvesting and Marketing Apples, by F. A. Waugh; Massachusetts Fruit Trees and their Insect Foes, by H. T. Fernald.

Commercial orcharding and its returns (*8. Internat. Landw. Kong. Wien, 4 (1907), Sect. XI, Ref. 1, pp. 76*).—A series of reports on this subject by E. Gross, A. Havelka, J. Löschnig, K. Mader, F. Rebholz, and Von Solemacher-Antweiler to the Eighth International Congress of Agriculture at Vienna in 1907. The reports discuss the advantages and disadvantages of extensive culture of orchard fruits, considerable data being given relative to the cost of production and returns from orchard fruits in Europe.

Report on orchard extension and the propagation of native varieties of fruits, C. A. Keffer (*Tennessee Sta., Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 61–64*).—This consists of an outline report of cooperative orchard experiments conducted by the station in middle Tennessee in 1907–8, together with a discussion of the fruit and trucking interests and possibilities in that section and an outline of proposed experiments with fruits and vegetables.

Can the general farmer afford to grow apples and suggestions on improving and spraying apple orchards, S. B. Hartman and H. J. Eustace (*Michigan Sta. Bul. 253, pp. 36–48, figs. 9*).—To show that it pays to grow apples along with other farming operations, S. B. Hartman gives a detailed account of the methods used and the results secured with 3 old and neglected apple orchards which consisted in all of 52 trees of various varieties.

The work of regeneration consisted chiefly of judicious pruning and spraying. Three good crops were secured during 5 years. The total expense for the period was $531.87, and the net profits $853.46, making at 33 trees per acre an average net profit per acre per year of $104.43. The trees also furnished free fruit for several families and for the stock. The bulletin concludes with suggestions on improving and spraying apple orchards.

The planting of the apple orchard, W. S. Thornber (*Washington Sta. Popular Bul. 14, pp. 4, figs. 2*).—This is designed for prospective apple growers and discusses location and soils, preparation of the soil, nursery stock, planting plans, planting operations, and varieties for different sections of Washington.

Some factors affecting the keeping qualities of American lemons, R. H. True and A. F. Sievers (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 26, pp. 17*).—The losses of lemons from parasitic diseases and blue mold, methods of preparing lemons for market, and the physical and chemical characteristics of lemons are discussed, and tentative results are given of studies made to determine the relation between the present methods of preparing lemons for the market and the keeping qualities shown by the fruit after shipment.

A chemical study of lemons relative to their acid, sugar, and water content indicates that there is a difference of a trifle less than 1 per cent of acid between the best keeping grade of fruit, the tent-cured fruit and the tree-ripened fruit, which latter class represents the poorest grade on the market. It was also shown, contrary to the opinion advanced by some, that the keeping quality of lemons does not appear to be directly influenced by the acid content. During the curing process the percentage of acid shows a tendency to increase, this being accredited chiefly to the water loss accompanying the curing process.

There is relatively little change in the sugar content during the early history of the fruit, the principal development coming after the fruit has reached its full size and is beginning to ripen. There appears to be no definite increase or decrease in the sugar content during the curing process.

The loss of water from the fruit during the curing process does not increase or decrease week by week with any regularity. The total evaporation from lemons cured in boxes in which the bottoms were paper-lined was somewhat less than where no papers were used. Water evaporation appears to be influenced greatly by existing weather conditions, location of the curing house, etc.

A simple puncture experiment was conducted to test the strength of the skin as a means of protection for the lemons. A blunted needle point applied with measured force was found to puncture the skin much more readily when applied directly over an oil gland than when applied in the sunken places between the glands. The resistance to puncture in tent-cured fruit appears to be double that of tree-ripened fruit, the oil glands of the latter being less protected.

A limited series of storage tests was made of tree-ripe, tent-cured and sweated lemons. Data are given showing the total loss of lemons from all forms of decay during 16 weeks in storage as well as the loss apparently due to blue mold, which source of danger, as in the case of oranges (E. S. R., 20, p. 43), is chiefly troublesome when the skin of the fruit has been mechanically injured. The tent-cured fruit possessed much better keeping qualities than the tree-ripe fruit. There was a great variation in the decay among the sweated lots, the cause of which has not been determined.

There appeared to be no material difference as to the keeping qualities between the fruit obtained from the coast, the foothills, and the inland districts.

The most serious cause of decay during the first 3 or 4 weeks was the blue mold. Five apparently distinct types of slow diseases of the rind were seen, which often possess striking form and color characteristics. No study was made of these diseases since the loss directly due to them was apparently small. At the end of 3 or 4 weeks the percentage of decay appears to decrease for a time, after which the fruit becomes weakened and a prevalent form of decay resembling in appearance and odor the virulent brown rot of the citrus region occurs. It is believed that the infection from this trouble probably takes place in California, the disease remaining undeveloped until weeks after arrival in the eastern market. The study of this disease is to be continued.

Contributions to the knowledge of the coco palm (Cocos nucifera) (*Bul. Kolon. Mus. Haarlem, 1909, No. 41, pp. 160, pls. 16*).—This is a collection of 5 prize essays by L. A. T. J. F. Van Oijen, J. B. Tabel, W. Tani, Sr., R. C. W. Welborn, and J. Bakker, consisting of accounts of the coconut palm in the Dutch East and West Indies relative to its botany, details of culture, insect pests and fungus diseases, and the production of copra, coconut oil, and coir. Data are also given relative to the extent of the industry, cost of establishing and maintaining plantations, yields, returns, etc.

Comparative tests of nitrogenous fertilizers in pot culture. A. Petit (*Bul. Mens. Off. Renseig. Agr.* [*Paris*], *8* (*1909*), *No. 1, pp. 7–9*).—Tests to ascertain the best amount of nitrate of soda to apply in case of certain ornamental plants are reported. The conclusion reached is that it is not safe to apply more than from 0.5 to 1 gm. of nitrate of soda at one time to each plant in pots 11 to 12 cm. in diameter, 1 to 2 gm. in pots 14 to 16 cm. in diameter, or more than 4 gm. in pots 20 cm. in diameter.

The workman's garden, A. Gravier and H. Latière (*Les Jardins Ouvriers. Paris, 1907, pp. VII+179, figs. 231*).—This is a popular manual on fruit, vegetable, and ornamental gardening, especially designed for amateur gardeners. In addition to a discussion of the general principles of gardening, the cultural details for growing all kinds of fruits, vegetables, and flowers and other ornamentals are given. Several chapters of the work are devoted to descriptions of various types of gardens, including working plans for the development of each type.

FORESTRY.

The management of mountains and private initiative, P. DESCOMBES (*8. Internat. Landw. Kong. Wien, 3 (1907), Sect. V, Rap. 3, pp. 22*).—This paper, which was presented at the Eighth International Congress of Agriculture at Vienna in 1907, consists of a summarized account of the attempts of the French Government, private landowners and associations to prevent soil erosion and disastrous torrents through the production and restoration of forests and other vegetation on the mountain slopes, regulation of pasturage, etc.

Instructions for reforesting land, C. R. PETTIS (*Albany: Forest, Fish and Game Com., 1909, pp. 22, pls. 18*).—This pamphlet contains directions for securing planting stock from the State nurseries, together with brief practical instructions on what, where, when, and how to plant. The text is accompanied by several plates portraying nursery and planting operations and forest plantations.

In order to furnish an idea as to the value of forest plantings, some yield, valuation, and financial rotation tables for white pine prepared by the Massachusetts forest authorities (E. S. R., 20, p. 541) are given.

Forest working plan for land belonging to the city of Fall River on the North Watuppa watershed, F. W. RANE and H. O. COOK (*Boston: State Forester, 1909, pp. 29, pls. 5, map 1*).—As a result of an examination of this tract of land by the Massachusetts forest authorities, a forest map and working plan have been prepared which, although primarily of local application, it is believed will prove of value in carrying on similar work for other cities and towns.

We must stop forest fires in Massachusetts, F. W. RANE (*Boston: State Forester, 1909, pp. 43, pls. 11, figs. 3*).—The author calls attention to the great need of checking the forest fires which occur in Massachusetts, reviews the forest-fire record of that State for 1908, and gives an account of the work which has already been undertaken by the State and enterprising towns in providing forest fire protection.

Review of forest administration in British India for the year 1906–7, S. EARDLEY-WILMOT (*Rev. Forest Admin. Brit. India, 1906–7, pp. II+54*).—This is the customary annual review of forest operations in the various provinces of British India, together with a financial statement for the year. All the important data, which are similar in character to those given in previous reports (E. S. R., 20, p. 342), are presented in tabular form. At the close of the year there were 240,138 square miles of all classes of forests, which represents 24.3 per cent of the entire area of British India. The area of reserve forests was 94,037 square miles. The surplus of revenue directly chargeable to revenue was 17,952,229 rupees (about $5,816,522).

Progress report of forest administration in the Province of Eastern Bengal and Assam, M. HILL (*Rpt. Forest Admin. East. Bengal and Assam, 1907–8, pp. 70+3, map 1*).—Data similar to the above are presented relative to forest operations in the province of Eastern Bengal and Assam for 1907–8. The report is accompanied by a map of the province showing the location of the various state forests.

Progress report of forest administration (*Rpt. Forest Admin. Coorg, 1907–8, pp. 12*).—Data similar to the above are presented relative to forest operations in the province of Coorg for 1907–8.

Progress report of forest administration in the Andamans for 1907–8, H. A. FARRINGTON (*Rpt. Forest Admin. Andamans, 1907–8, pp. IV+33*).—Data similar to the above are presented relative to forest operations in the province of Andamans for 1907–8.

Investigations of mixed stands, SCHWAPPACH (*Ztschr. Forst u. Jagdw., 41 (1909), No. 5, pp. 313–332*). The details, including tabular data and conclusions reached, are given of investigations conducted by the author in East Prussia and Silesia relative to the growth behavior of mixed forest stands in comparison to that of pure stands, the determination of the influence of mixed stands upon the soil condition, and a study of methods of developing and managing mixed stands.

Forest flora of the Berar Circle, D. O. WITT (*Nagpur: Govt., 1908, pp. VII+103*).—This consists of a descriptive list of trees, shrubs and climbers, and other plants of the Berar Circle, especially those of economic importance in times of scarcity and famine. The species are grouped under their respective families and the scientific as well as the vernacular names when known are given. Special care has been taken to indicate characteristics readily noticeable in the field, and the lesser known species are described with considerable detail, although technical terms have been avoided so far as possible.

Notes on Sâl in Bengal, A. L. MCINTIRE ([*Indian Forest Dept.*] *Pamphlet 5, Sylvicult. Ser. 1, pp. 1–16*).—This consists of popular notes on the distribution, culture, and uses of Sâl (*Shorea robusta*), which is the principal forest tree in Bengal, and occurs in greater or lesser abundance in all parts of that country.

Tapping experiments with Kickxia elastica in Kamerun, A. SHULTE (*Gummi Ztg., 23 (1909), Nos. 28, pp. 877–880; 29, pp. 914–916*).—In confirmation of the work reported by Strunk in 1906 (E. S. R., 17, p. 980) the author found the perpendicular slit method of tapping to be superior to the herringbone method for the Kickxia rubber tree, but not so well adapted for tapping Hevea. Just how far apart these perpendicular slits should be spaced, and the length of time which should elapse before the second tapping is made in order to secure the best results both as to yield and the health of the tree, were not determined, although it appears that the Kickxia can not be tapped so frequently as the Hevea. Yields from individual Hevea trees are greater than from Kickxia trees, but the latter can be planted closer.

Exports and imports of forest products, 1908, A. H. PIERSON (*U. S. Dept. Agr., Forest Serv. Circ. 162, pp. 29*).—Summarized and detailed tables are given for 1908 relative to the exports and imports of forest products, including both raw and manufactured material of various kinds, together with summarized tables on the exports and imports of forest products for the years 1904–1908, inclusive, and other data. The data are derived for the most part from the annual report of the Bureau of Statistics of the Department of Commerce and Labor, entitled Foreign Commerce and Navigation of the United States for the year ending June 30, 1908.

DISEASES OF PLANTS.

Notes on plant diseases in 1908, W. J. MORSE (*Maine Sta. Bul. 164, pp. 28, pls. 2, chart 1*).—In connection with the regular lines of investigation, the pathologist of the station has given some attention to a number of minor problems, which are briefly reported upon. These include potato diseases, orchard tree diseases, development of scab on limed potato soils, self-boiled lime-sulphur as a substitute for Bordeaux mixture for apple scab, weather records in relation to winter injury of fruit trees, crotch injury of apple trees, and winter injury of white pine.

The potato disease causing the most trouble was the early blight (*Alternaria solani*), very little of the late blight being observed even on unsprayed fields. Both the blackleg and Fusarium disease have appeared in Maine, but neither is as yet widely distributed.

Among the orchard diseases under observation were the black rot, bitter rot, brown rot, pink rot, and species of Penicillium, Botrytis, Rhizopus, and Alternaria. In addition 4 other rots were observed, which are caused either by undescribed species or fungi that have not been reported as causing apple decays. A brief account is given of the development of the apple scab (*Venturia inæqualis*) on apples in storage. This was believed to be due to several factors, the principal one being that the entire growing and harvesting season was very wet so that the vegetative development of the fungus continued up to and during the harvest time. The moist apples, covered with spores, were placed in rather warm cellars, resulting in the infection of the fruit and the formation of small scab spots in storage.

In continuation of previous investigations (E. S. R., 19, p. 955), the author has made a study of the development of potato scab on limed soils and has found that the effect of lime on the amount of scab is fully as great at the end of 3 years as at the end of 2. In the author's experiments, planting 2 successive crops of potatoes largely increased the amount of scab on limed soil. The percentage of scabbed potatoes was decidedly greater on the limed than on the unlimed plats and was almost in direct proportion to the increase in the quantity applied.

Some experiments are reported on the use of self-boiled lime-sulphur as a substitute for Bordeaux mixture for apple scab, which seem to indicate that this fungicide is of considerable value, particularly for use in connection with varieties of apples that are susceptible to Bordeaux injury.

A study has been made of the weather records at the station in relation to winter injury of fruit trees, and the conclusion is reached that it would be unsafe to invest much money in attempting to grow any but the most hardy varieties of apples in those portions of the State where the lowest winter temperature reaches —30° F.

A note is given on crotch injury of apple trees, which resembles that described in a publication of the New York Cornell Station (E. S. R., 17, p. 1083), and there attributed to *Bacillus amylovorous*. Repeated attempts to isolate the bacteria or fungi from infected material failed to show the presence of any organism, and as the injury seemed to be coincident and associated with the winterkilling resulting from the severe winter of 1906–7, it is believed that the low temperature was responsible for the injury in this case.

Notes are given on the winter injury of white pine in 1908, particularly of the young trees which are springing up over waste lands and abandoned pastures. No fungus appears to be associated with the disease and the injury is attributed to excessive transpiration during very cold weather. The disease is believed to be identical with that described in a publication of the Forest Service (E. S. R., 20, p. 549).

Some bacterial diseases of plants, W. G. Sackett (*Colorado Sta. Bul. 138, pp. 3–23*).—The purpose of this bulletin is to call attention to some of the more common bacterial diseases of plants that are either known to be present in the State or which may be expected in the future. The diseases described are the bacterial disease of alfalfa; pear blight; soft rot of the sugar beet; black rot of cabbage; blight of the potato, tomato, eggplant, and tobacco; bacteriosis of beans; and wilt of the cucumber, cantaloup, and squash.

Notes on plant diseases occurring in North Carolina, F. L. Stevens and J. G. Hall (*North Carolina Sta. Rpt. 1908, pp. 66–82, figs. 10*).—The distribution and economic importance of a number of the more common diseases that have been reported in North Carolina are described, and notes given on their control so far as definite means are known. The arrangement is alphabetical by host plants.

The parasitic diseases of cultivated plants, G. Delacroix and A. Maublanc (*Maladies des Plantes Cultivées. Maladies Parasitaires. Paris, 1909, pp. VIII + 452, pls. 83*). This is one of the numbers of the agricultural series published under the direction of G. Wery, and treats of the diseases of cultivated plants due to parasites. The material is grouped into 3 parts, the diseases of bacterial origin, those due to fungi, and those caused by phanerogamic parasites, and the arrangement is by orders of parasites. The fungi and other parasites are described, their host plants mentioned, and the disease caused characterized, after which notes are given on the treatment or prevention of the disease.

The enemies of fruit trees and cultivated plants, V. Vermorel (*Les Ennemis des Arbres Fruitiers et des Plantes Cultivées. Villefranche (Rhône), 1909, pp. 50*).—Brief descriptions are presented of the more important fungi and insects which attack fruit trees and cultivated plants, the arrangement being alphabetical according to the common names of the pests. Formulas are also given for the preparation and directions for the application of a considerable number of the better known fungicides and insecticides.

Ear rots of corn, T. J. Burrill and J. T. Barrett (*Illinois Sta. Bul. 133, pp. 65–109, pl. 1, figs. 21*).—According to the authors, ear rots of corn are caused by a number of species of fungi, and 4 typical forms of rot are described. The first, caused by *Diplodia zeæ*, is apparently the most widely spread and the one doing the most injury at the present time. The other forms of the disease are all due to species of Fusarium, and the authors believe that 3 distinct species of that genus are responsible for the trouble.

The mycelium of the Diplodia occurs in an active growing condition on the ear and inner husks. The fungus winters over on old infected ears and stalks and under favorable conditions new infections start in the green ears. The life history of the fungus, its growth in cultures, germination of spores, the results of inoculation experiments, etc., are described at length.

Among the Fusarium diseases, the first described produces on the ears of corn a dense, feltlike mass of white mycelium, which extends between the kernels to the cob, causing it to become more or less diseased. The fungus evidently occurs upon the cornstalks, but its life history is yet unknown. The second form of the disease is characterized by having a deep pink or reddish color, due to pigment produced in the hyphæ of the fungus. The mycelium penetrates the inner husks and silk and holds them firmly to the ear. The third form of the Fusarium disease is less destructive and, so far as observed, the infected ears have only a few diseased grains, and the corn may be utilized for feeding purposes. The mycelium of this species is white, sparse, and found principally in the ends of the kernels, where it feeds upon the starch and produces large numbers of spores.

For the prevention of these different diseases, the authors recommend the destruction of all the old stalks which may be affected, and the avoiding of the planting of corn for at least 2 years in or near regions that are known to be badly infected.

The synonymy of the different fungi is described at some length.

A study of corn mold, F. L. Stevens and J. G. Hall (*North Carolina Sta. Rpt. 1908, pp. 37–49*).—The authors state that a disease of corn known as mold, mildew, rot, etc., was reported quite commonly in 1906, and a study was begun at that time.

Specimens have been obtained from a number of sections of the State, and as a result of the investigations the authors state that of 3 species of Diplodia which have been described as occurring on corn, *D. macrospora* comes nearest the description of the material found occurring on most of the ears of corn,

although *D. maydis* was prevalent in some cases. This latter species has been recently described as being injurious in Illinois (E. S. R., 20, p. 153).

Experiments upon the effect of formalin upon the germination of oats, F. L. Stevens (*North Carolina Sta. Rpt. 1908, pp. 30–36*).—Experiments were conducted to determine the effect of different strengths of formalin, the time of soaking, the effect of quality of seed grain, etc. The solutions used varied from 1 oz. of formalin to ½ gal. of water to 1 oz. to 3 gal. and the time of treating from 2 to 24 hours, and a number of varieties of oats were included in the test.

The greater strength solutions were decidedly injurious, but there was little difference where the dilution was 1 oz. to 1 gal. or 1 oz. to 3 gal. Marked differences in varieties were noted in their resistance to the injurious effect of formalin, and in experiments in which the effect of the quality of the seed on resistance to formalin was tested it was found that the better the quality the less the injury due to the treatment. Where seed was treated with 1 oz. of formalin to 1 gal. of water, the loss of germinating power was very slight with good seeds and somewhat more with the medium grade, but the treatment was quite destructive to the poorer seed. This is held to be a valuable elimination, and is of benefit in removing the poorer seed to the betterment of the sowing.

The influence of Bordeaux mixture on the assimilation of potato plants, O. Kirchner (*Ztschr. Pflanzenkrank., 18 (1908), No. 2, pp. 65–81*).—A review is given of a considerable number of experiments of others that were held to indicate larger yields due to spraying, the results being attributed to a stimulating effect of Bordeaux mixture and to its having prolonged the growing season of the plants. The author then describes his own experiments in spraying potatoes, as carried out during 3 seasons.

The plats were so situated as to be partially shaded. The first year there was but little difference in favor of or against the spraying, and no Phytophthora was observed on the plants of one series while there was a very slight attack on the untreated plants in the other. In 1905 more favorable returns for spraying were obtained. In 1907 potatoes were again planted where the experiment of 1904 had been conducted and the plants sprayed 4 times with a 2 per cent Bordeaux mixture. The yields and percentages of starch were decidedly in favor of the unsprayed plats in this experiment. If the yield of the unsprayed plats is represented by 100, the average of the sprayed plats would be 69.4 per cent as to tubers, and 68.4 per cent as to starch.

The summer of 1907 was very cold and cloudy, and it is thought that the presence of Bordeaux mixture on the leaves impaired their assimilatory activity. Whether the same results would be obtained during a bright warm season is thought doubtful, and further investigations are required to determine this point.

Diseases of sugar beets, O. Fallada (*Österr. Ungar. Ztschr. Zuckerindus. u. Landw., 38 (1909), No. 1, pp. 11–17*).—A brief account is given of some of the more common diseases to which the sugar beet is subject, among them the root rot due to *Phoma betæ*, dry rot, beet scab, bacteriosis of beets, the root rot caused by *Rhizoctonia violacea*, club root due to *Myxomonas betæ*, and various leaf diseases, including those caused by *Cercospora beticola*, *Sporidesmium putrefaciens*, *Ramularia betæ*, and the curly top disease.

Root diseases of sugar cane, F. A. Stockdale (*West Indian Bul., 9 (1908), No. 2, pp. 103–116*).—A description is given of the root disease caused by *Marasmius sacchari* with suggestions for its control. The means recommended include the use of fungicides for the disinfection of cane cuttings, rotation, and the elimination of rattoon crops.

A Mycosphærella wilt of melons, J. G. GROSSENBACHER (*New York State Sta. Tech. Bul. 9, pp. 193–229, pls. 6*).—An account is given of investigations on a muskmelon disease which caused considerable injury to plants grown in the greenhouses during 1907 and 1908. The disease was accompanied by attacks of a red spider, but in 1908 the spiders caused but little injury. The disease seems to be similar to that reported from Delaware (E. S. R., 5, p. 787; 17, p. 47) and the literature from the Delaware Station is critically reviewed.

During 1907 and 1908 the author made a study of the disease which appeared on the muskmelon vines in the station greenhouses at about the time the vines attained their full growth. The affected plants wilt, their lower nodes and some of the internodes become oily-green in color with or without exudation, and finally turn dark and gummy or dry and gray.

Cultures were made of the fungus and both ascospores and pycnidiospores were obtained and inoculations proved the identity of the organisms. Inoculations were also made of a number of related species of cucurbitaceous plants, but *Cucumis melo* was the only one that was positively affected, although it is probable that it occurs also on the watermelon. Technical descriptions are given of the 2 forms with the names *Mycosphærella citrullina* n. n. and *Diplodina citrullina* n. n.

According to the author, there is little probability of the disease becoming a menace in fields, as the fungus requires moist warm environment for its infection and development.

Gooseberry mildew and gooseberry cultivation, J. ERIKSSON (*Jour. Roy. Hort. Soc. [London], 34 (1909), No. 3, pp. 469–472*).—An account is given of the introduction of the gooseberry mildew (*Sphærotheca mors-uvæ*) into Europe and the present aspect of the question is presented.

Necrosis of the grapevine, D. REDDICK (*New York Cornell Sta. Bul. 263, pp. 323–343, figs. 17*).—According to the author, a careful examination of vineyards in 3 of the large grape-growing regions of New York showed that many of the vines were dying and that apparently the trouble was due to a fungus. Some work has been done on the life history of the parasite, and it is believed that enough is known to warrant a preliminary report in order to call attention to the disease, to obtain further information regarding it, and to suggest preventive measures.

As far as the author's observations have gone, the Concord seems most affected, although the trouble has been noted upon a considerable number of other varieties. The disease is apparently identical with that described in Circular 64 of the Ohio Station (E. S. R., 18, p. 845), where it is called localized stem blight. Its presence may be recognized in a number of ways, among them the failure to put out shoots, the splitting of vines during hot weather, the dying of new shoots after a short period of growth, the dwarfing of the shoots and leaves, and a yellowing or blanched condition of the leaves, often crimpled about the margins.

The fungus causing this disease is identified as *Fusicoccum viticolum* n. sp., a technical description of which is given. The fungus is apparently distributed to a slight extent by the washing of the spores from the vines, but more commonly by carrying infected material on pruning shears, and through the distribution of diseased stock. The progress of the fungus on the old wood of the vine is slow and its action indicates that it is a wound parasite.

Since the fungus is inside the tissues when the presence of the disease is indicated spraying would have no effect, except that thorough spraying in May and June would probably prevent new infections. The eradication of the disease must be through the renewal of the entire vine or a part of it, and pruning should be resorted to, the vines being carefully cut below the diseased areas.

Gall formations on apple trees, JULIE JAEGER (*Ztschr. Pflanzenkrank., 18 (1908), No. 5, pp. 257–272, pl. 1, fig. 1*).—Anatomical studies are reported on galls observed on several varieties of apples, and the causes of similar galls on a number of other plants are pointed out. Among these are mentioned the crown gall, various cankers due to fungi, and galls caused by different insects. The galls occurring on the apples are attributed for the most part to attacks of mites.

Fall blossoming of the apple induced by the black rot, H. S. REED (*Plant World, 11 (1908), No. 11, pp. 256, 257*).—A description is given of the fall blooming of an apple tree at the Virginia Station, which was induced by a serious infection of the black rot (*Sphæropsis malorum*). The Sphæropsis cankers were abundant and had caused the death of over half of the top of the tree. Many of the small branches made little growth during the season, and it was upon these that the fruit buds opened.

Lime-sulphur mixtures for the summer spraying of orchards, W. M. SCOTT (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 27, pp. 17, figs. 2*).—The success attained in experiments in 1907 (E. S. R., 19, p. 1154) with self-boiled and unboiled lime-sulphur mixtures for the control of apple and peach diseases led to the repetition of the experiments on a larger scale in 1908, and the principal features of these experiments are discussed. Home-boiled, factory-boiled, and self-boiled lime-sulphur mixtures were employed and their efficiency in preventing diseases of peaches, cherries, and apples was tested, together with their effect upon the host plants.

The lime-sulphur mixtures were found to be very efficient in the control of the diseases of the fruit trees mentioned and less injurious to the foliage than Bordeaux mixture. In the experiments with the self-boiled lime-sulphur mixture, it was found that for peach foliage considerable injury was done to the leaves where the mixture was allowed to stand too long with a minimum amount of water. Where cold water was used to stop the cooking, no injury resulted from its use. The experiments with this fungicide showed that it was quite efficient in controlling peach scab, brown rot, cherry-leaf spot, and apple scab.

Where the self-boiled mixture is employed as a fungicide, the last treatment should be made at least a month before picking time, otherwise the fruit will be badly stained.

The commercial lime-sulphur solutions, two brands of which were used, adhered better and remained effective longer than the self-boiled mixture.

The use of arsenicals with the commercial lime-sulphur is as yet an unsettled question. With the self-boiled mixture arsenate of lead or Paris green may be used, but since Paris green is injurious to the peach, it is unsafe to use it in spraying peach trees during the growing period.

Concerning the influence of sulphur dioxid fumes on fruit and fruit rot fungi, T. ZSCHOKKE (*Landw. Jahrb. Schweiz, 22 (1908), No. 14, pp. 899–908, figs. 8*).—The effect of sulphur dioxid on stored fruit and the fungi causing rots was studied. Apples and pears were naturally and artificially infected with fungi, among which were *Glœosporium fructigenum*, *Mucor stolonifer*, *M. piriforme*, and *Botrytis cinerea*, after which the fruit was subjected to fumes of sulphur dioxid. The treatment seemed without protective value, and in practice the author advises against its use, as the fruit was often injured and in some cases made worthless by the fumigation and the fungi were not in the least affected.

Yellowing of citrus trees, J. MULLER (*Agr. Jour. Cape Good Hope, 34 (1909), No. 2, pp. 149–157, figs. 2*).—The author states that for some time complaint has been made that citrus trees were dying in South Africa. At first sight it was suspected that root rot was the cause of the trouble, but on examination it was

found that the crowns and larger roots were apparently healthy in every case. Various reputed causes for the disease were investigated, and collections of soils and leaves were made for analysis, which showed that the soils were poor in plant food and that the leaves were decidedly deficient in lime, sulphates, and phosphoric acid. Some fertilizer experiments have been planned in which the trees are to be given a generous supply of superphosphate and sulphate of potash with the hope that the trouble may be overcome.

Coffee leaf disease in the East Africa Protectorate (*Gard. Chron., 3. ser., 45 (1909), No. 1162, p. 214*).—Attention is called to the destructive nature of the coffee leaf disease (*Hemileia vastatrix*) wherever it occurs. According to the author, the exports of coffee from Ceylon have decreased from about $15,000,000 in 1880 to $125,000 at the present time, due almost exclusively to attacks of the fungus.

The Hemileia is known to occur in most of the coffee-growing districts of the East, being present in Ceylon, India, Java, Sumatra, Singapore, the Philippines, Samoa, Mauritius, and Madagascar, and in Natal, German East Africa, and other places on the mainland of Africa.

In order to prevent the introduction of the fungus into British East Africa, official action has recently been taken prohibiting the importation of coffee plants from any region where the fungus is suspected as being present.

The resistance of Coffea congensis to Hemileia vastatrix, J. Dybowski (*Agr. Prat. Pays Chauds, 9 (1909), No. 71, pp. 159, 160*).—Attention is called to the fact that plants of *C. congensis* have remained resistant to Hemileia for a number of years when adjacent trees of *C. arabica* have been utterly destroyed. The author claims that 7 years' observations have definitely shown the resistance of this variety to the attacks of Hemileia, and he further states that the quality of the coffee is in no way inferior to that of the Arabian variety.

The fungus diseases of coconuts in the West Indies, F. A. Stockdale (*West Indian Bul., 9 (1909), No. 4, pp. 361–381*).—Descriptions are given of a root disease due to Botryodiplodia, a leaf disease caused by *Pestalozzia palmarum*, and the bud-rot disease of bacterial origin. The occurrence of these diseases throughout the West Indies is traced and suggestions are given for their control.

The Diplodia disease of the coconut palm, A. Fredholm (*Proc. Agr. Soc. Trinidad and Tobago, 9 (1909), No. 3, pp. 159–172, pls. 6*).—A description is given of a disease of the coconut palm which the author claims is caused by combined attacks of a fungus and bacteria. The fungus is held to be the cause of the disease and it is believed to be the same as that described under the names Diplodia, Botryodiplodia, and Lasiodiplodia. It is thought that it may also prove identical with *Diplodia epicocos*, which has been described as occurring on the coconut.

The nature of the disease and its manner of spreading are described. As the palm has but one growing point, the bud, if this is destroyed there is no possibility of saving the trees. For the prevention of the disease, sanitary precautions and cultivation are recommended.

The fungi of Hevea brasiliensis, T. Petch (*Ztschr. Pflanzenkrank., 18 (1908), No. 2, pp. 81–92*).—Notes are given on the parasitic fungi known to attack the leaves, stems, and roots of Para rubber trees, about 30 species of fungi being mentioned. Attention is called to the fact that a number of the more destructive species have other economic plants, such as coffee, tea, cacao, and palms, as their hosts, and in making plantations this fact should be taken into consideration.

Spraying for fungus pests, G. Massee (*Jour. Roy. Hort. Soc. [London], 34 (1909), No. 3, pp. 305–312, figs. 2*).—This is a paper presented at a conference

on spraying fruit trees, in which the general subject of spraying for the prevention of plant diseases is discussed.

Iron arsenate and copper fungicides, V. Vermorel and E. Dantony (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 14, pp. 423, 424*).—On account of frequent requests for information regarding the combination of iron arsenate with copper fungicides to be used as a combined fungicide and insecticide, the authors were led to investigate the subject, and they state that the mixture is not practicable for several reasons. In the first place, the times of application for the prevention of the principal insects and for mildew do not coincide. In addition, the combination is decidedly destructive to foliage, particularly if an alkaline arsenate is added to the sulphate of copper. In conclusion, the authors state that the iron arsenate should be used alone and in no case combined with copper.

Some points in the preparation of Bordeaux mixture, W. Kelhofer (*Internat. Phytopath. Dienst (Beigabe Ztschr. Pflanzenkrank.), 1 (1908), No. 3, pp. 65–73, figs. 7*).—A study was made of some of the factors which must be considered in the preparation of Bordeaux mixture of good quality. Among these were the influence of the quality of the lime and copper sulphate, the relative proportions in which they are employed, the method of mixing the solutions, and the effect of the addition of sugar to secure greater adhesiveness.

Within certain limits, the quality of the material was found to be of less importance than the relative quantities used. In preparing Bordeaux mixture it is recommended that the copper sulphate solution be slowly poured into the lime mixture. A low temperature of the solutions was found to prevent the rapid separation of the material, a temperature of about 15° C. being preferred to one of 75°. A much slower precipitation was obtained when the copper sulphate was poured into the lime than when the reverse process was followed. The addition of sugar delayed precipitation on standing, and when stock solutions are used it is essentially advantageous in delaying the separation of the mixture.

The increasing of the stability of Bordeaux mixture through the addition of sugar, W. Kelhofer (*Landw. Jahrb. Schweiz, 22 (1908), No. 14, pp. 860–865, fig. 1*).—A study was made of Bordeaux mixture to which varying quantities of sugar was added. The solution after preparation was placed in glass cylinders and the amount of precipitate measured from day to day. It was found that the rapidity of precipitation was greatly reduced by the addition of sugar.

Analyses of some fungicides, W. Kelhofer (*Landw. Jahrb. Schweiz, 22 (1908), No. 14, pp. 870–874*).—Analyses are reported of a number of fungicides, most of which are commercial preparations. Among them are Renommée, ground sulphur, Sulfostite, azurin, and Tuv.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Revision of the mice of the American genus Peromyscus, W. H. Osgood (*U. S. Dept. Agr., Bur. Biol. Survey, North American Fauna No. 28, pp. 285, pls. 8, figs. 12*).—This work consists of a systematic study of the genus Peromyscus, which includes the so-called wood mice, deer mice, vesper mice or white-footed mice; keys for the identification of the various forms; and illustrations and maps which show the geographic distribution of the species.

The mice of this group occur in great abundance throughout the United States, particularly in the Western States, but up to the present time the interrelations and ranges of the various forms had not been worked out. More than 27,000 specimens were examined in this work.

The various species of the genus have widely different local habitats, some inhabiting woodland, others swamps and watercourses, others open upland prairies, and others rocks, cliffs, and arid desert regions. Even single species are said to live under a surprising diversity of conditions. All are habitually nocturnal, though occasionally individuals under unusual circumstances may be seen abroad by day. Many of them doubtless burrow to some extent, but in most cases those that live underground occupy natural openings or retreats formed by other animals. They do not hibernate, but remain active throughout the winter even in northern latitudes.

Although the food habits of various species are not quite the same, in general it may be said that very few feed extensively upon green and succulent food, such as is taken by the meadow mice, but nearly all prefer dry food, especially seeds and small nuts. Nearly all the species readily enter buildings in search of food and finding an easy living make themselves permanently at home. On the whole, they are less injurious to agricultural interests than meadow mice, but nevertheless they are vermin and their undue increase should be checked. This can be accomplished best by trapping and poisoning as in the case of meadow mice.

On the paratyphoid and food-poisoning bacilli, and on the nature and efficiency of certain rat viruses, F. A. BAINBRIDGE (*Jour. Path. and Bact., 13 (1909), No. 4, pp. 443–466*).—"The viruses examined owe their potency to one or other of two bacilli which are indistinguishable from *B. aertryck* or *B. enteritidis* respectively.

"Under the conditions of the experiments, namely, the provision for the rats of abundant space, food, and shelter, the destructive power of the viruses was inconstant; the death-rate in different experiments varying from 20 to 50 per cent.

"Experiments made with phosphorus paste under similar conditions caused a higher and more uniform mortality than did any of the viruses, the death-rate varying from 61 to 67 per cent.

"There is reason to believe that a certain proportion of the rats fed on the virus become immune, and would therefore be unlikely to succumb to a second infection.

"The statements of the entire innocence of the viruses for man require justification."

A bibliography of 28 titles is appended.

The bacillus of the commercial product "ratin" as a means for exterminating rats, XYLANDER (*Arb. K. Gsndhtsamt., 28 (1908), No. 1, pp. 145–167; abs. in Bul. Inst. Pasteur, 6 (1908), No. 17, pp. 786–788*).—Details are here presented of the cultural and bacteriological characters of the "ratin" bacillus and of feeding experiments therewith. Under the most favorable circumstances 50 per cent of the wild rats remain immune to its action, this being due probably to old infections with the Gärtner group.

Some reflections regarding the free use of bacteriological cultures for the destruction of rats and mice, J. DANYSZ (*Brit. Med. Jour., 1909, No. 2508, pp. 209, 210*).—The author here considers the possible source of danger to man from the use in the destruction of rodents and other small mammals of certain microbic cultures that belong to the Salmonella or *Bacillus enteritidis* group.

According to the most recent investigations two types are to be distinguished among these bacilli, first, those to which belong the bacillus of Loeffler, that of hog cholera, and that of psittacosis, all apparently identical with *B. paratyphus B.*, and second, those to which belong the bacilli of the viruses of Danysz, Issatschenko, Neumann, and Dunbar, which seem to be identical with the *B. enteritidis* of Gaertner. While the microbes of the Salmonella group are

extremely widespread in nature and are frequently found in cases of poisoning through food, it is considered as far from being proved that they are active agents in these occurrences. Such cases are considered as probably due to ptomaines, etc.

It is concluded that "microbic cultures which have been handled for more than 10 years by more than a million individuals, and which have been scattered broadcast on bread or grain in many parts of the world and placed within reach of domestic or other animals without causing any serious accident, can not reasonably be considered dangerous."

California ground squirrels, C. H. MERRIAM (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 23 (1908), No. 52, pp. 1861–1864*).—Three genera and a dozen species of ground squirrels are said to occur in California. In addition to the great losses to agriculture caused by these animals it has recently been discovered that they can be infected with plague, a few cases from this source having been reported. The beechey ground squirrel (*Citellus beecheyi*), the species found to be a carrier and disseminator of plague, is particularly considered. Attention is called to the importance of coyotes, badgers, foxes, and the golden eagle as natural enemies, and directions are given for trapping, poisoning, and destruction through the use of fumigants.

Suggestions concerning treatment of seed corn with deterrents against crows, B. M. DUGGAR and M. M. MCCOOL (*New York Cornell Sta. Circ. 6, pp. 13–16*).—In the experiments reported the percentage of seed corn that developed following treatment with different substances was as follows: Treated with pine tar, 98 to 100; with coal tar, 98 to 100; with turpentine emulsion for 3 hours, 38; with turpentine emulsion for 4½ hours, 8; with pyridin solution for 3 hours, 98 to 100; and with anilin oil solution for 3 hours, 0. The results of these experiments are considered as demonstrating conclusively that the use of tar in no way prevents germination, and further that a protracted treatment with turpentine is extremely injurious. It was found that tar at the rate of 2 tablespoonfuls per 10 qt. of seed was sufficiently effective to coat almost every seed in the mass.

"As a result of our own experiments it is not possible to say that the use of tar will effectively deter crows, since no observations could be made upon the effect of the treatment in repelling these birds. It was possible, however, to determine that tar is obnoxious to fowl. . . . Seeds which had been treated with a coal tar were also exposed in a room where mice had proved a nuisance. None of the corn thus treated was touched. . . .

"Corn freshly treated with either of the tar preparations could not be employed in the corn planter without experiencing great difficulty in uniformly dropping the seed. On the other hand, it is found that when properly spread on the dry floor the treated corn will completely dry out in a few days so that it may be used without difficulty in a planter. According to the experience of others, a quart or two of fine land plaster or sifted ashes may be mixed with the seed immediately after the tar treatment, and the treated seed may in this way be used immediately without serious inconvenience. In this case it would perhaps be wise to use a minimum amount of tar."

How to attract and protect wild birds, M. HIESEMANN, trans. by EMMA S. BUCHHEIM (*London, 1908, pp. 86, figs. 34, dgm. 1*).—A small guide on bird protection and preservation, which has been translated from the German. The provision of suitable nesting places, feeding in winter, suppression of enemies, etc., are considered at length.

Eelworms, T. W. KIRK (*New Zeal. Dept. Agr. Ann. Rpt., 16 (1908), pp. 123–126, pls. 4, figs. 5*).—The species which have become injurious in New Zealand are the stem eelworm (*Tylenchus devastatrix*), the cucumber eel-

worm (*Heterodera radicicola*), the beet eelworm (*H. schachti*), and the ear cockle (*T. tritici*). A brief account is given of each.

A manual of forest zoology for India, E. P. Stebbing (*Calcutta: Govt., 1908, pp. XVIX+229+XVIV, pls. 118*).—This work is stated to have been primarily drawn up as a manual for the use of students at the Imperial Forest College at Dehra Dun, India. Pages 21–167 are devoted to the insects.

The insect book, W. P. Westell (*New York and London [1908], pp. X+120, pls. 20*).—This is a brief popular account of insects.

The senses of insects, A. Forel, trans. by M. Yearsley (*London, 1908, pp. XIV+324, pls. 2*).—A translation and rearrangement from the German.

A sport of the silkworm (Bombyx mori) and its hereditary behavior. K. Toyama (*Bul. Assoc. Séri. Japon, 1908, No. 200, pp. 1–12; Ztschr. Induktive Abstam. u. Vererbungslehre, 1 (1909), No. 3, pp. 179–188*).—Finding red worms to suddenly arise from a cross between two normal black breeds, the author conducted experiments in view of working out the laws of their inheritance, the details of which are here given. The following are the conclusions arrived at:

"(1) The sport 'red worms' may arise from the normal black breed by crossing which apparently brings about the segregation of the dominant character; (2) the red worm thus produced remains constant from its first appearance; it is recessive toward the ordinary black worms and segregates from the latter according to the Mendelian law of heredity; and (3) sometimes it happens that the segregation of both characters is not complete as in the case observed by Correns in plants."

Catalogue of the diptera of Argentina, Paraguay, and Uruguay. J. Brèthes (*An. Mus. Nac. Buenos Aires, 3. ser., 9 (1908), pp. 277–305*).—Fifty families represented by a total of 650 species are included.

Danish diptera, W. Lundbeck (*Diptera Danica. Copenhagen and London, 1907, pt. 1, pp. 166, pl. 1, figs. 47; 1908, pt. 2, pp. 169, figs. 48*).—In part 1 the families Stratiomyiidæ, Xylophagidæ, Coenomyiidæ, Tabanidæ, Leptididæ, and Acroceridæ, and in part 2 the families Asilidæ, Bompyliidæ, Therevidæ, and Scenopinidæ are taken up.

Specific characters in the bee genus Colletes, M. H. Swenk (*Univ. [Nebr.] Studies, 8 (1908), No. 1, pp. 43–102, pls. 3*).—Keys are presented for the separation of the bees of the genus. Twenty-six species are described, of which 3 and 1 subspecies are new to science.

Notes and descriptions of North American parasitic hymenoptera. VII. C. T. Brues (*Bul. Wis. Nat. Hist. Soc., n. ser., 6 (1908), No. 3–4, pp. 154–163, figs. 2*).—Descriptions are presented of 9 new species belonging to the genera Cephalonomia, Proctotrypes, Aphanomerus, Asaphes, Chrysocharis, Nesomyia, Cosmophorus, Rosneta, and Bephratoides, the last two of which genera are new.

The insect galls of Indiana, M. T. Cook (*Proc. Ind. Acad. Sci., 1907, pp. 88–98*).—Seventeen well defined species of galls are added to the list previously noted (E. S. R., 17, p. 572).

Locusts in India, H. M. Lefroy (*Dept. Agr. Bombay Bul. 32, pp. 12, pls. 7*).—Two species, the northwest locust (*Acridium [Schistocerca] peregrinum*) and the Bombay locust (*A. succinctum*), are said to be periodically destructive to crops in India. The two species differ in life history and habits, and are checked by diverse methods. The biology of these locusts and methods of control are briefly considered.

Report on destruction of locusts, W. Honey (*South. Rhodesia, Rpt. Sec. Agr. 1907, pp. 24–26*).—A brief report of the campaign conducted by Rhodesia against locusts. It is estimated that a total of 14,109 swarms were destroyed by means of arsenite of soda and through the agency of fire.

Some insects injurious to truck crops. The hop flea-beetle (Psylliodes punctulata), F. H. Chittenden (*U. S. Dept. Agr., Bur. Ent. Bul. 66, pt. 6,*

pp. 71–92, pls. 3, figs. 8).—The hop flea-beetle has during the past 3 years become unusually abundant, with the result that in the Chilliwack and Agassiz Valley hop-growing regions of British Columbia it has caused the loss of about 80 per cent of the crop, or a cash loss estimated at not less that $125,000.

This beetle is a native American species, quite distinct from any found on hops in England or on the Continent. It is shown to be generally distributed in the northern United States and southern Canada, from the Atlantic to the Pacific, but does not appear to occur south of Nebraska.

This flea-beetle affects both surfaces of a leaf, gnawing through the skin and devouring the pulp, usually leaving the skin on the opposite side entire; this latter becomes discolored, forming yellowish-brown freckles as the leaf grows and expands, the skin at this point in time becoming torn and frequently showing holes. When the beetle occurs in moderate numbers the leaves become riddled as by fine shot, the punctures being most obvious after the plants have made some growth. In its attack on hops it frequently causes the leaves to look like a mass of network or more or less completely strips the vines of leaves.

As in the case with flea-beetles in general, this species does most harm to young plants. The injury is most noticeable on hops, sugar beets, rhubarb, and some other vegetables. Eggs, larvæ, and pupæ have been taken at a depth of 3 to 6 in. from the surface of the ground in hop fields. The larvæ apparently feed on the roots of hops as well as those of other plants growing in the yards.

An account by H. J. Quayle of the life history and habits of the pest as it occurs in British Columbia is presented. In that locality the beetles appear very early in the spring. Those taken in mating and inclosed in vials with earth at the bottom have laid eggs in from 8 to 10 days. The eggs have been taken on the hop roots about 4 in. below the surface and larvæ from 2 to 4 in. below the surface, both around hop roots and in the spaces between the vines away from the roots. Brief notes are presented on the larval habits of the American and European species of Psylliodes, and on local conditions and natural influences. Methods of control are considered at some length. It is said that unless the hop plants are sprayed nearly every day it is practically impossible to keep them sufficiently covered with poison to entirely protect from the ravages of these beetles.

"The abundance of the beetles when they appear early in the season on young plants, their constant reappearance, and the constant new growth of the plants from day to day make it difficult to apply direct remedies with more than temporary benefit. Where the hops are sprayed with kerosene emulsion or whale-oil soap for the hop aphis, the numbers of the beetles are lessened. Among measures which give promise of value are the institution of clean methods of cultivation, including deep fall plowing, treating hop poles in such manner as to prevent the beetles from hibernating in them, and clearing all remnants from fields so as to leave them as bare as possible to prevent the beetles from sheltering there in winter. Arsenate of lead, Paris green, kerosene emulsion, whale-oil soap, and Bordeaux mixture should receive further tests, as should the employment of trap crops in the manner advised in this article."

A complete bibliography consisting of 12 titles, with annotations, is included.

Report on tobacco insects, A. C. Morgan (*Tennessee Sta., Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 68–72*).—This is a brief report of the investigations being made in cooperation with the Bureau of Entomology of this Department.

The tobacco flea-beetle (*Epitrix parvula*) was unusually abundant in 1907, as the result of the exceptional weather conditions. Through lax methods in keeping seed beds properly covered with canvas many beds were destroyed and it is

estimated that this resulted in a needless loss to growers of over $400,000. It has been found that the injury to newly set plants by flea-beetles, grasshoppers, tree crickets, etc., can be greatly reduced by spraying directly after setting with arsenate of lead (1 lb. to 16 gal. of water). Upon plant beds the remedy to be used against flea-beetles is arsenate of lead in paste form in water at the rate of 1 lb. to 12 gal. of water, applied in a fine spray. If powdered arsenate of lead is used, ½ lb. to 12 gal. of water is sufficient. When the plants are very small, that is, have not more than 4 or 6 leaves and barely cover the ground, 12 gal. of the insecticide will spray about 240 sq. yds. of bed.

Sod land intended for tobacco should be plowed in the fall in order to destroy the vegetation and thus starve many of the cutworms. As a further remedy for cutworms it is recommended that clover or a similar succulent plant be poisoned with Paris green mixed with sweetened water and dropped about the field at intervals of a few feet 3 or 4 days before setting plants.

The greatest insect problem to the growers is the tobacco hornworm, of which there are 2 species, the northern (*Phlegethontius quinquemaculata*) and the southern (*P. sexta*). Both species occur in Tennessee, but the southern form is by far the more numerous. The only remedy besides hand picking in use to any extent against the tobacco worms is the application of Paris green in powdered form. Arsenate of lead in powdered form and as a spray is now being tested. Attention is called to the great need in Tennessee for a standard of purity for insecticides. Observations made of the hornworm showed a mortality of 39 per cent due to the breaking up of the protecting cells as brought about by fall plowing.

As a result of experiments it is recommended that all land upon which tobacco is grown be plowed in the fall in preparation for the succeeding crop; also, that the old practice of poisoning "Jimson" blooms with cobalt to kill the tobacco moths when they feed be revived. A rotation that would be effective against tobacco worms and at the same time would supply humus and preserve the fertility of the soil is briefly mentioned. A tentative outline is given of the work for 1909.

Insects injurious to tobacco, G. E. Anastasia (*Bol. Tec. Coltiv. Tabacchi [Scafati]*, 7 (1908), *No. 3-4, pp. 173-181, pl. 1*; 8 (1909), *No. 1, pp. 3-9, pl. 1*).—A continuation of work previously noted (E. S. R., 20, p. 1151). The first article considers, under the Aphididæ, the species *Schizoneura corni* and *Dreparosiphon aceris*, and the second, the Aleyrodidæ, of which *A. tabaci* is taken up at some length.

How to fight cranberry insects, H. J. Franklin (*Massachusetts Sta. Bul. 126, pp. 8*).—In this bulletin, which is a revision of Bulletin 115, previously noted (E. S. R., 18, p. 954), are given the practical applications resulting from 2 years' study and experiments on cranberry insects.

In combating the cranberry fruit-worm (*Mineola vaccinii*) on bogs which have a water supply for winter flowage and for reflowage, it is recommended that reflowing be done immediately after picking and continued for 10 days or 2 weeks. After allowing the foliage to ripen the water should be put on for the winter, and drawn off as a rule early in April, but every third or fourth year it should be held until after the middle of May. On winter-flowed bogs which do not have a water supply for reflowage, the winter flowage should be put on as soon as possible after the cranberry foliage has ripened and hardened and held until early in April. Every third or fourth year it should be held until after the middle of May. In all cases, the screenings should be buried to destroy any worms which may be in them, and the cracks and crevices where worms may have spun up in the screen house, if near the bog, should be cleaned out in order to guard against infection from this source.

The fireworm (*Eudemis vacciniana*) is rarely, if ever, troublesome in Massachusetts on strictly dry bogs, apparently because of parasites and winterkilling of the eggs, parasites probably being by far the more effective of the two. If the false army worm (*Calocampa nupera*) is found in sufficient abundance to make it advisable, the bogs should be flowed for 24 to 36 hours as soon after May 15 as practicable. If caterpillars are present a few days after the first reflow, the water should be put on again for 24 to 36 hours. On bogs with winter flowage only, the winter flowage should be held until after the middle of May every third or fourth year. On dry bogs, if young worms are found to be hatching plentifully, spraying should be done at once with arsenate of lead used at the rate of 7 lbs. to 50 gal. of water.

In Massachusetts the yellowhead cranberry worm (*Peronea minuta*) is troublesome only on dry bogs. One thorough spraying with arsenate of lead at the rate of 5 lbs. to 50 gal. of water at the time of the hatching of the eggs of the second brood of worms is sufficient to clear a badly infested bog for 3 or 4 years. For the cranberry girdler (*Crambus hortuellus*) on bogs which can be reflowed, it is recommended that such be done immediately after picking and continued for a week or 10 days. In case a dry bog be badly infested the vines should be burned with a gasoline torch, choosing a time when the vines would not otherwise burn readily, to guard against a fire which might escape from control. This burning should be done early in the season before the growth starts. Hints on spraying and on the use of water are appended.

Some injurious orchard insects, A. F. Conradi and W. A. Thomas (*South Carolina Sta. Bul. 143, pp. 3–35, figs. 15*).—This is a general account of the more important insect pests of orchards in South Carolina and methods of control.

Next to the San José scale the peach-tree borer is considered the most destructive to peach trees in the State. According to records kept during 1908, pupation begins about July 1, there being a gradual increase until the maximum period of pupation is reached about August 2. There is then a gradual decline until about September 2, and a few specimens go into pupation even as late as September 16. Adults begin to emerge on July 20, gradually increasing in numbers until about August 22, when there is a decline in numbers until about September 20.

At the station 3 generations of *Scolytus rugulosus* developed during the year, the fourth remaining in the larval stage in the bark during the winter. The woolly aphis is found in South Carolina on the roots of the apple at all seasons of the year.

Investigations made during 1908 show that the San José scale has made heavy inroads in almost every section of the State and is causing enormous losses in peach orchards. The plum curculio, which is common everywhere in the State, has come to the attention of the author principally as a peach pest. The plum aphis (*Aphis setaria*), oyster-shell bark-louse, apple aphis, and codling moth are also briefly considered.

The sulphur-lime wash, A. L. Melander and R. K. Beattie (*Washington Sta. Popular Bul. 16, pp. 4*).—Directions for the making and application of the lime-sulphur wash.

The lesser apple leaf-folder (Peronea minuta), R. L. Webster (*Iowa Sta. Bul. 102, pp. 181–212, figs. 13*).—This pest is said to have been the source of considerable injury to apple stock in nurseries and young orchards during the past 2 years.

The larva folds a single leaf or ties several leaves together and remains inside this hiding place, where it feeds undisturbed. Frequently several young larvæ will tie up the tender unfolding leaves of the growing tips and work inside the protection thus formed. In such a place the larvæ often bore through the

tender leaves, riddling them with small holes. Infested trees present a tied-up and scraggly appearance where the leaf-folders become very numerous. The leaves in which the folder works turn brown as the result of the feeding, and a badly infested block of apple stock may have the appearance of having been swept by fire.

The leaf-folder itself is a greenish-yellow worm, about ½ in. long when it is full grown. It is slightly hairy, but these hairs or setæ are hardly noticeable. There are two different forms of the moths, an orange-colored form which appears in the late spring and in the summer, and a slate-colored form which appears in the fall. The leaf-folders appear three times during the season: First, as soon as the leaves are out on the trees; second, about the middle of June; and third, early in August. They remain on the trees from 4 to 6 weeks before they become mature.

Where there is only a small area infested much benefit can be obtained by picking or pinching the infested leaves. From the experiments here recorded it is concluded that in order to be effective spraying must be done when the leaf-folders are very young or while they are still in the egg stage. A home-made arsenate of lead applied when the folders were in the egg stage gave good results. The 1½ strength composed of arsenate of soda 6 oz., acetate of lead 18 oz., and water 50 gal., is recommended. The natural enemies of this pest are said to play an important part in regulating its abundance. Two species of tachinids determined as belonging to the genera Nemorilla and Bactromyia were bred by the author from these folders. The ichneumonid, *Chorinœus carinatus*, was bred from the pupal stage. The braconid, *Clinocentrus americanus*, is said to have been the most common parasite. *Chalcis orata*, and several new chalcids, were also reared. The synonymy and life history are considered, in addition to which technical descriptions of the stages, and a bibliography of the more important references are given.

Wormy apples and how to prevent them. Results of spraying for codling moth in 1908. J. E. Buck (*Virginia Sta. Bul. 181, pp. 3–13, figs. 9*).—Following an account of the life history of the codling moth, spraying experiments are reported, the details of which with the results obtained are presented in tabular form. The results of spraying by several practical fruit growers are also given. The more important points brought out have been summarized by the author as follows:

"There are two broods of codling moth in Virginia.

"Temperature conditions governing the blooming of the apple trees seem to determine also the appearance of the first moths in the spring.

"The spraying right after the petals fall from the bloom is most important, it being possible to kill over 97 per cent of the worms by one thorough drenching application of arsenate of lead at this time.

"Both Paris green and arsenate of lead, when thoroughly applied, will produce a high percentage of worm-free fruit. A pressure of at least 60 to 80 lbs. is necessary to produce a good spray with Bordeaux caps.

"Arsenate of lead has proved superior to Paris green in all our tests this season. It adheres better, and can be applied simply in water without any danger to fruit or foliage. One and one-fourth pounds in a drench spray, and 2 lbs. in mist sprays to each 50 gal. of spray, have given good results, the results being slightly in favor of the mist spray, where two sprayings were given.

"Spraying 18 to 20 days after the petals fell from the bloom this season gave very good results, and indicates that it may be worth while to make the applications this late if for any reason the spraying has not been done at the proper time. No one, however, should neglect the earlier spraying with this in view, as it may not prove true for every year.

"This season's records indicate that about 9 nine weeks from the time the petals fall is the right time to give the first spraying for the second brood."

Hyponomeuta malinella, D. SARACOMENOS (*Cyprus Journ., 1908, No. 11, pp. 275–277, pl. 1*).—The author describes the life history and habits of the apple-tree ermine moth. Arsenicals are said to control the pest.

Investigations of the olive fly, J. CHAPELLE and J. RUBY (*Bul. Agr. Algérie et Tunisie, 14 (1908), No. 22, pp. 543–547*).—A report of experiments conducted in 1908 by the olive-culture service with remedies for the olive fly.

Hymenopterous parasites of the olive fly in Italy and the probable existence of other parasites in the native home of the fly, F. SILVESTRI (*Atti R. Ist. Incoragg. Napoli, 6. scr., 59 (1907), pp. 657–677*).—The 4 species *Eupelmus urozomus, Eulophus longulus, Eurytoma rosæ*, and *Dinarmus dacicida* of the family Chalcididæ are the important parasites of the olive fly. Their habits and importance in combating the fly are considered at length. There appears to be a considerable variation in the relative percentage of infestation by the different species at the different points from which collections were made. The author also considers the methods of breeding and utilizing these parasites. He concludes that a study of the parasites of the olive fly in the native home of the olive in southern and western Asia ought to result in the discovery of species that will assist in the control of the pest.

The olive tineid, J. CHAPELLE and J. RUBY (*Bul. Mens. Off. Renseig. Agr. [Paris], 7 (1908), No. 6, pp. 677–680; Rev. Vit., 30 (1908), No. 759, pp. 14–17*).—The injury caused by the olive tineid (*Tinea oleælla* or *Prays oleæ*) is said to place it among the most injurious of the olive pests, it often causing more injury than the olive fly. Attention is called to a work published by F. Silvestri,[a] and from which information upon its life history has been taken. Descriptions of the life stages are given, there being 3 generations during the year. The larvæ of the first generation cause injury by boring in the bark of the younger limbs, the larvæ of the second generation live in the flower buds, and the larvæ of the third generation infest the fruit. *Agoniospis fuscicollis* is mentioned as a parasite of the pest, and remedial measures are briefly considered.

Observations on treatment of the Eudemis, R. UTEAU and F. PERPEZAT (*Rev. Vit., 30 (1908), No. 782, pp. 656–658*).—A brief report of investigations made of the several methods recommended in combating the grapevine eudemis (*E. botrana*).

An enemy of grafts and cuttings in nurseries, P. HOC (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 29 (1908), No. 39, pp. 390, 391*).—The larva of *Helops lanipes* is described as the source of considerable injury to grafts and cuttings. Naphthalin placed about young vines has given considerable protection. An insecticide known as vaporite has also given good results.

[Forest insects], E. P. STEBBING ([*Indian Forest Dept.*], *Scr. Forest Zool., Leaflets, 1908, Nos. 1, pp. 8, figs. 5; 2, pp. 5, figs. 5; 3, pp. 7, figs. 2*).—In the first of these leaflets the author considers the sal bark-borer (*Sphærotrypes siwalikensis*), in the second the teak defoliator (*Hyblæa puera*), and in the third the teak leaf skeletonizer (*Pyrausta machæralis*).

The biology of and remedies for bark beetles, E. KNOCHE (*Forstw. Centbl., n. ser., 30 (1908), Nos. 3, pp. 141–153; 4, pp. 200–209; 5, pp. 245–254*).—A somewhat extended discussion of these insects and the methods of dealing with them.

A monographic study of the Chermesidæ, C. BÖRNER (*Arb. K. Biol. Anst. Land u. Forstw., 6 (1908), No. 2, pp. 81–320, pls. 6, figs. 101; abs. in Riv. Patol. Veg., 3 (1908), No. 8, pp. 121–124*).—In part 1 of this work the author

[a] La Tignola dell' Olivo. Portici, 1907.

considers the phylogeny and morphology, in part 2 the classification, in part 3 the effect upon conifers, in part 4 the biology, and in part 5 the economic importance and methods of combating these insects. A bibliographic list of 118 titles is appended.

British oak galls, E. T. CONNOLD (*London, 1908, pp. XVIII+169, pls. 68, figs. 17*).—In this work the author presents chapters on the principles of oak gall formation, oak gall growth, numerical aspects of oak galls, Cynipidæ affecting the oak, the British oak, hints on collecting and mounting oak galls, etc. Fifty-four galls formed by Cynipids are considered, the author taking up under each the English name, position, manner of growth, colors, size, time of year to be sought, place of pupation of the larvæ, time of emergence of the adults, parasites and inquilines. Numerous photographic illustrations are given of the various galls.

Gum-tree blight and the natural enemy, T. W. KIRK (*New Zeal. Dept. Agr. Ann. Rpt., 16 (1908), pp. 117–122, pls. 7, figs. 2*).—This insect (*Eriococcus coriaceus*), which became established in New Zealand about 1900, has spread rapidly and proved much more destructive than in Australia. Several species of lady beetles were introduced from Australia and Auckland, but only *Rhizobius ventralis* appeared to thrive under the changed conditions. This species, however, is said to have succeeded in greatly reducing the numbers of the pest.

Abstract of a preliminary report on insects affecting live stock in Hawaii, D. L. VAN DINE and V. A. NÖRGAARD (*Reprint from Proc. Hawaii. Live Stock Breeders' Assoc., 5 (1907), pp. 19–70, pl. 1, dgm. 1*).—This report is a consideration of the insects injurious to live stock in Hawaii and a summary of the preliminary investigations made by the authors, in cooperation with the Bureau of Entomology of this Department.

The insects affecting live stock in Hawaii are said to be second in economic importance only to those injurious to sugar cane. The two principal pests discussed are the horn fly and the sheep maggot fly, either of which causes a greater direct loss to the live stock industry of the Territory than all of those remaining. The authors estimate the losses, direct and indirect, due to these pests, to have aggregated between $60,000 and $75,000 during 1907.

The horn fly was introduced into Hawaii in shipments of cattle from the western coast of this country to the Island of Oahu during 1897, and in the following year spread to all the other islands. Preventive and curative measures considered at some length include the introduction of parasites and birds, destruction by spraying and trapping, and destruction of larvæ in the dung. The warble fly (*Hypoderma bovis*) and the heel fly (*H. lineata*) are said to have been carried to Hawaii on imported cattle, but neither seem to have become established.

A few cases of screw-worm fly infestation have been reported, but it seems to have been supplanted by a new species known as the Hawaiian sheep maggot fly (*Calliphora dux*), which has worked great havoc among the sheep and lambs on the various islands of the group. It is said that no reference can be found in the literature of animal parasites where a practically obscure species supposedly infesting only dead animal tissues has so suddenly adapted itself to living animals with such serious results. When the eggs are deposited on wool the resulting maggots appear within 24 hours and work down through the wool to the body. They do not attempt to penetrate the unbroken skin as do the screw-worm maggots but work in a constantly moving intermingled mass causing irritation, which brings about inflammation, suppuration, and ulceration on the products of which the larvæ feed. When the skin is completely destroyed the maggots penetrate with ease in all directions under the skin forming pockets,

fistulas, and sinuses, and the animal dies from septicemia or exhaustion. As the maggots mature they drop to the ground and pupate in the soil. The life cycle does not extend over 3 weeks and the larvæ or maggots develop in less than 10 days. Curative and preventive measures are briefly considered. The advantages and disadvantages that would result from the introduction of the turkey buzzard are discussed and correspondence on this subject with the Biological Survey of this Department is presented.

The life history and habits of the maggot fly or blow fly of Australia (*C. occanicæ*) as worked out by Froggatt are briefly considered. Several specimens of the English blue-bottle fly (*Lucilia sericata*) have been taken with *C. dux* on the Island of Molokai, and an account of its life history, habits, etc., as worked out by C. Warburton and by G. T. Brown is discussed at some length. The screw-worm fly (*Compsomyia macellaria*) is said to have been observed on the Island of Molokai. The American blue-bottle fly (*L. cæsar*) has been recorded from the Island of Hawaii by Grimshaw. *Sarcophaga barbata* has been bred in immense numbers upon meat, and with *S. pallinervis* has been collected from the islands of Oahu and Molokai. The injurious sheep botfly or head maggot (*Œstrus ovis*) has been recorded from the Island of Kauai by Grimshaw.

Under insects affecting horses the author considers the stable fly, the horse botfly, which is common in the Territory, and the horse chin fly (*Gastrophilus nasalis*), which has been collected from both Oahu and Kauai. Brief mention is also made of several parasites of hogs, dogs, and poultry.

The mosquitoes of the Philippine Islands, Clara S. Ludlow (*Washington, 1908, pp. 65*).—Records are here presented of the distribution of certain species and their occurrence in relation to the incidence of certain diseases.

Remarks on the study of biting flies, with special reference to the genus Glossina, A. E. Hamerton and H. R. Bateman (*Jour. Roy. Army Med. Corps, 11 (1908), No. 1 pp. 24–45, figs. 3*).—This article is an introduction to the practical study of the life history and general anatomy of flies concerned in the dissemination of trypanosome diseases. A list of 32 references is appended.

The Ixodoidea or ticks, G. H. F. Nuttall (*Jour. Roy. Inst. Pub. Health, 16 (1908), No. 7, pp. 385–403, figs. 20*).—In this, the first Harben lecture, the author discusses the ticks, their life history, habits, and rôle in disease transmission.

Spirochetosis in man and animals, G. H. F. Nuttall (*Jour. Roy. Inst. Pub. Health, 16 (1908), No. 8, pp. 449–464*).—In this, the second Harben lecture, the author considers the spirochetes, their disease production, and conveyance by ticks and bugs.

Piroplasmosis, G. H. F. Nuttall (*Jour. Roy. Inst. Pub. Health, 16 (1908), No. 9, pp. 513–526, figs. 3*).—This is the third of the Harben lectures delivered by the author. A general account is given of the diseases produced by Piroplasma, their correlation with the Ixodidæ, life cycle, etc.

The rôle of ticks in the transmission of disease, Meuleman (*Ann. Méd. Vét., 57 (1908), Nos. 8–9, pp. 460–469; 10, pp. 540–552*).—Following a brief review of the rôle of insects and arachnids in the transmission of disease the author discusses at length the part played by ticks. A table which illustrates the biology of the ticks implicated and the manner of transmission is appended.

Apiculture, T. W. Kirk (*New Zeal. Dept. Agr. Ann. Rpt., 16 (1908), pp. 158–162, pls. 4*).—The bee industry is said to be rapidly expanding in New Zealand. The report of the work of the year by I. Hopkins, apiarist, is here included. From specimens of diseased combs forwarded to the Bureau of Entomology of this Department it was determined that the American foul brood occurs in the Dominion.

Annual report of the Royal Sericultural Station, Padua (*Ann. R. Staz. Bacol. Padova, 35 (1907), pp. 140, pl. 1*). In this report the director, E. Verson, reviews the work of the station for the year 1906–7, and presents a further study of the glands of the silkworm. E. Quajat presents a study made of the influence of high temperature on the eggs of silkworms, and E. Bisson reports on a study of the influence of external conditions in rearing upon the physical condition of the cocoon. Mulberry culture in southern and insular Italy is also considered by E. Quajat. Experiments on the relative quantity of foliage required by pure-bred silkworms and crosses are reported by P. Tomaselli and G. Manolescu. A list, compiled by E. Bisson, of publications pertaining to sericulture, published during 1906–7, is appended.

FOODS—HUMAN NUTRITION.

Chemical studies of American barleys and malts, J. A. Le Clerc and R. Wahl (*U. S. Dept. Agr., Bur. Chem. Bul. 124, pp. 75, pl. 1*).—This study of the composition of American-grown barleys and malts was undertaken to ascertain the relative value for alcohol production and for brewing of the ordinary 6-row and 2-row varieties produced in different regions of the United States. The studies of the barleys and corresponding malts also afforded an opportunity to investigate chemically and physically the changes taking place during the malting of barley.

According to the experimental data reported, "the 2-row barleys are somewhat richer in starch, extract, bran, and endosperm, have a higher bushel and 1,000-grain weight, and a higher coefficient of mealiness and degree of dissolution than the 6-row varieties. On the other hand, the 2-row variety contains less protein, fiber, pentosans, hulls, sulphur, embryo, and steely grains than the 6-row. The Bay Brewing barleys have a higher bushel and 1,000-grain weight than the ordinary 6-row barley, but less protein. The Utah Winter barleys have the most endosperm and contain the most starch, yield the most extract, have the highest coefficient of mealiness and degree of dissolution, and contain the least protein.

"The 6-row barley malts contain the highest percentage of protein, lecithin, soluble protein, and embryo, but are lowest in starch, extract (in coarse grist), bran, weight per bushel, and weight per 1,000 grains.

"The 2-row barley malts are highest in weight per bushel, extract, and coefficient of mealiness, but lowest in fiber, pentosans, hulls, and embryo.

"The Bay Brewing and Utah Winter barley malts are highest in starch, hulls, and weight per 1,000 grains, and lowest in protein, soluble protein, endosperm, extract (fine grist), and coefficient of mealiness.

"It has been shown that large kernels yield a higher percentage of extract than small kernels of the same protein content. The former contain more starch, weigh more per bushel, and give a higher coefficient of mealiness. The heavier kernels average less in protein content and contain more starch. The small grains of the same variety contain more bran, hulls, fiber, pentosans, and ash than do the larger grains. When barleys are divided into two groups—those of high and low protein content—the former are richer in fiber, pentosans, hulls, bran, and embryo; the latter weigh more per bushel and per 1,000 grains, and have more mealy grains after steeping, besides containing more extract, starch, and soluble protein.

"Mealy grains are generally lower in protein content. The permanently steely grains are richer in protein. A high phosphoric acid content is generally accompanied by high starch and low protein. A larger proportion of the protein of low-protein barley is soluble than of the high-protein barley. The average

percentage of protein in 6-row barley is about 12; of 2-row barley, 11.5; of Bay Brewing barley, less than 11; and of Utah Winter barley, less than 10 per cent.

"The most interesting changes occurring during the process of malting are the increase in sugars, lecithin, soluble protein, and embryo, and the decrease in starch, ash, phosphoric acid, potash, magnesia, lime, bran, hulls, endosperm, fiber, fat, and total protein. The pentosans undergo very little, if any, change."

The influence of malt diastase preparations on bread baking, M. P. Neumann and P. Salecker (*Landw. Jahrb., 37 (1908), No. 5, pp. 857–872*).—Experiments with several malt preparations led the authors to conclude that the addition of such material favorably affects the dough and gives a larger loaf without lowering the quality. The effect of the malt preparations is primarily due to the diastatic enzym they contain which changes some of the starch present into sugar. When sugar is added to the dough, larger loaves are also obtained, but the effect is not so pronounced as with malt. Better results were obtained when malt extracts were used with flours of high gluten content than with other flours though variations were noted. In the experiments reported the addition of malt extract did not lessen the quantity of yeast required.

The use of malt extract in bread making, H. A. Kohman (*Nat. Baker, 14 (1909), No. 159, pp. 25–27*).—Experiments are briefly reported on the use of malt extract in bread making, which the author considers in general to be favorable. "The amounts that can be successfully used depend upon the strength of the flour and the diastatic activity of the extract. With a weak flour one must use low diastatic extracts, while with strong flours one may use larger quantities or extracts with a greater diastatic power."

Text-book of meat hygiene, R. Edelmann, trans. by J. R. Mohler and A. Eichhorn (*Washington, 1908, pp. XII+402, pls. 8, figs. 157*).—This volume discusses hygiene with special reference to the ante-mortem and post-mortem inspection of food-producing animals. Among the principal subdivisions may be noted the following: Origin and Source of Meat Food; Morphology and Chemistry of the Principal Tissues and Organs of Food Animals; The Production, Preparation, and Conservation of Meat; Regulations Governing Meat Inspection of this Department; Abnormal Conditions and Diseases of Food-Producing Animals; Examination and Judgment of Prepared and Preserved Meats, as Well as Chickens, Game, Fish, Amphibiæ, and Crustaceans; History of Meat Hygiene; and Abattoirs and Stock Yards. It is stated that in this translation additions have been made.

The deterioration and commercial preservation of flesh foods. II, The storage of beef at temperatures above the freezing point, W. D. Richardson and E. F. Scherubel (*Jour. Indus. and Engin. Chem., 1 (1909), No. 2, pp. 95–102*).—In continuation of earlier work (E. S. R., 20, p. 1156), an extended series of analyses was made of meat kept at room temperature with and without preservatives, and of meat stored at 2 to 4° C. Some of the latter samples were after a time frozen and held at −9 to −12° C., in order to determine whether freezing arrests decomposition promptly or whether when once started it continues in the frozen state. Methods of bacterial decomposition in meat and similar questions were also considered.

"While there are some contradictory figures in the analyses of the samples which were frozen after being stored at 2 to 4° C., from the results the conclusion may fairly be drawn that freezing of meats at −9 to −12° C. arrests bacterial decomposition, but can not in any degree restore the product to its original condition."

Methods of chemical control in the New Zealand meat freezing works, A. M. Wright (*Jour. Soc. Chem. Indus., 28 (1909), No. 3, pp. 124, 125*).—The author briefly describes the chemical processes employed in connection with

tankage, dried blood, tallow, wool, meat extract, oleomargarine, glue, and other materials. The paper is followed by a discussion.

On preservatives in meat foods packed in cans or glass, A. W. J. MacFadyen (*Local Govt. Bd. [Gt. Brit.], Med. Dept., Rpts. Insp. Foods, 1908, No. 6, pp. 37*). The practice of American manufacturers regarding the use of preservatives in canned meats exported to the United Kingdom, the presence of preservatives in raw materials which may be employed in the preparation of British-made canned and glass packed meats, and the practice of British manufacturers with reference to the use of preservatives in such goods are the questions considered in this investigation of meat foods. In the form of appendixes a number of analyses of different sorts of preserved meat and of a patent preservative are reported by P. A. E. Richards.

The inspection of meat in Paris in accordance with the law of August 1, 1905, Martel (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 4, pp. 70–76, dgm. 1*).—The data summarized are chiefly statistical.

Taxes and fees collected at abattoirs, H. Martel (*Hyg. Viande et Lait, 2 (1908), No. 2, pp. 489–518*).—The subject is discussed with special reference to French conditions.

Unfermented grape juice, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 166, pp. 23*).—Seventy samples were collected, of which 2 were spoiled and 5 appeared to be fermented wines. Of the remaining 63 samples 51 contained no alcohol or a trace so small as to be negligible, 11 contained from 1 to 5 per cent proof spirit, and 1 sample above 5 per cent.

Of the 63 samples examined 11 contained salicylic acid as a preservative. "It is interesting and important to note that, with two exceptions, those samples which contain salicylic acid contain very considerable percentages of alcohol; showing that the preservative has been added to the already fermenting juice, to stay further fermentation, and not to the fresh juice, in order to prevent fermentation from beginning." Ten of the samples of grape juice and 1 of the wines contained coal-tar dyes. "It is worthy of note that most of the samples which contain dyes contain a preservative also."

Maple sirup, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 153, pp. 11*).—Of 84 samples of maple sirup examined 61 were found genuine, 4 doubtful, 13 adulterated, and 6 mixtures.

Maple products, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 157, pp. 19*).—Samples of maple sugar and maple sirup collected in the Dominion of Canada were examined. Of 71 samples of maple sugar 62 were found to be genuine and 8 adulterated, while 1 was doubtful. Of 71 samples of maple sirup 62 were declared genuine, 3 compound, and 6 adulterated.

Judging by a summary of work carried on since 1905, "a noteworthy increase in the percentage of genuine samples is observable; and this is especially marked in the case of maple sirup."

Ground coffee, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 172, pp. 37*).—Of 449 samples of ground coffee purchased in the Dominion of Canada 391 were found to be genuine and 45 adulterated, while 13 were sold as compounds.

Table oils, H. Güth (*Pharm. Zentralhalle, 49 (1908), Nos. 49, pp. 999–1003; 50, pp. 1017–1021*).—A number of analyses of olive oils and other oils are reported with a view to the detection of adulteration.

The influence of freezing and thawing upon wine, E. Rousseaux (*Ann. Sci. Agron., 3. ser., 3 (1908), II, No. 3, pp. 420–428*).—The experimental data are discussed with reference to the French pure-food laws.

Hindering fermentation in sweet solutions by means of preservatives, H. Lührig and A. Sartori (*Pharm. Zentralhalle, 49 (1908), No. 46, pp. 934–*

942).—Laboratory studies with a number of preservatives are reported, including formic acid, benzoic acid, ammonium fluorid, pyrocatechin, abrastol, and hexa-methyl-tetramin.

Report of the department of food and drugs, State board of health, to March, 1909, H. E. BARNARD (*Mo. Bul. Ind. Bd. Health, 11 (1909), No. 2, pp. 15–22*).—Of the 355 samples of milk and milk products, butter, beverages, sausages, extracts, canned goods, etc., examined 108 were found to be illegal. Information is also given regarding the drugs examined and the prosecutions brought under the food and drug law.

Official inspections, C. D. WOODS (*Maine Sta. Off. Insp. 1, 2, 3, 4, 5, 6, pp. 8 each*).—These publications contain data regarding the examination of foods, drugs, and fertilizers under the State law, data regarding standards, advice to manufacturers and dealers, and similar matter, and in some cases the results of examinations. The materials considered include sausage, maple products, ice cream and ice cream substitutes, soda water, drugs, flavoring extracts, pickles, catsup, oysters, salt fish, rice, vinegar, and fertilizers.

Report of the First International Congress for the Suppression of Adulteration of Foods and Drugs (*Compt. Rend. Trav. Cong. Internat. Répr. Fraudes Aliment. et Pharm. Genève, 1 (1908), pp. 290*).—A list of officers and delegates, rules and regulations, minutes of meetings, standards recommended, and other similar data are included in this report of the International Congress for the Suppression of Adulteration of Foods and Drugs, held at Geneva, September 8–12, 1908.

Summary of official enactments and documents relating to public hygiene (*Rec. Actes Off. et Doc. Hyg. Pub., Trav. Cons. Sup. Hyg. Pub. France, 37 (1907), pp. 723, pl. 1, figs. 19*).—The material included in this volume is summarized under three general heads, namely, Legislation and Administration, The Work of the Superior Consul of Public Hygiene in France, and Supplementary Documents.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 50, pp. 2; 51–53, pp. 7; 54–55, pp. 4; 56–57, pp. 4; 58–63, pp. 12; 64–65, pp. 4*).—The subjects included are the adulteration of coffee, misbranding of bottled beer, canned corn, a drug, coffee, lemon extract, canned apples and vinegar, and adulteration and misbranding of oats, lithia water and buckwheat flour.

Decision of the Attorney-General in regard to the legality of the Referee Board (*U. S. Dept. Agr., Food Insp. Decision 107, pp. 6*).—The decision of Attorney-General Wickersham in regard to the legality of the referee board appointed to give advice upon questions arising from the enforcement of the Food and Drugs Act is quoted in full. It sustains the legality of the board.

Drug legislation in the United States, L. F. KEBLER (*U. S. Dept. Agr., Bur. Chem. Bul. 98, rev., pt. 1, pp. 343*).—In this revision of an earlier bulletin (E. S. R., 18, p. 421) the summaries of Federal and State enactments regarding drugs have been brought up to July 15, 1908, the present edition being necessitated by the large amount of new legislation along this line which has been enacted since the bulletin was first published. The material is arranged alphabetically by States.

The fireless cooker, ELLEN A. HUNTINGTON (*Bul. Univ. Wis., No. 217, pp. 38, figs. 10*).—The author summarizes historical and other data regarding fireless cookers and reports the results of investigations on the use of different materials in the construction of such cookers and the effects of amounts and density of materials upon the conservation of heat.

From studies of the materials of which the fireless cooker was made, the packing material, and the effects of the density of the food cooked, the author concludes that "so far as the retention of heat was involved, (1) the outside

retainer might be round or square, made of galvanized iron or wood; (2) the packing material should be mineral wool; (3) the larger the mass and the greater the density of the food cooked, the better the conservation of heat."

From the experiments on methods of preparing food with the fireless cooker, the following conclusions were drawn:

"These experiments show the possibilities of the fireless cooker, which based on scientific principle proves itself practicable for household use." Experiments with custard and potatoes show that it is possible to overcook some foods if they remain too long in the cooker.

"Foods may be well cooked in it and it proves most desirable and economical of time and fuel for those foods which require long slow cooking, such as oatmeal, meats, and dried fruits. Since the temperature is that of boiling water, it is not practical for cooking those foods which require the high dry heat of an oven, or for steaming. It may be possible to overcome this difficulty by inserting a quantity of liquid which has a higher boiling point than water.

"Also, there is a certain economy of fuel, labor, time, and utensils in using the fireless cooker.

"Housekeeping has lagged far behind other industries. An evidence of this has been the disregard of small economies. There is, however, a growing tendency toward such economies and toward measuring them accurately and scientifically. . . .

"[In using a fireless cooker] it is self-evident that there will be no loss of water from evaporation as there is in cooking over a flame, and allowance should be made for this. It is also evident that salt or flavoring matter must be added to the foods before they are placed in the cooker."

As the author notes, the fireless cooker may be used for insulating and keeping ice cream or other such materials cold.

How to spend a shilling on food to the best advantage, S. H. DAVIES (*York Health and Housing Reform Assoc. [Food Chart No. 1], folio*).—This chart shows by means of colored diagrams the nutritive and energy value of 25 cts. worth of bread, cheese, and other common foods. The accompanying text discusses the foods and their relative value.

How to feed a family of five on twelve shillings nine pence a week (*York Health and Housing Reform Assoc., Food Chart No. 2, pp. 4, figs. 6, dgm. 1*). This leaflet, which is one of a series (see above) designed for popular instruction, gives inexpensive menus for a week, with the quantities of the several foods required per day, and recipes and cooking notes. The amount of nutrients in several of the foods and the nutrients and energy in the suggested menus are shown by means of colored diagrams.

Cost of feeding city prisoners (*Municipal Jour. and Engin., 26 (1909), No. 17, p. 718*).—Information is given regarding the character and cost of the food of prisoners in the county jail and the city and county prison of San Francisco. In the former institution the average cost of feeding and clothing was 23 cts. per person per day and in the latter the average cost of feeding each prisoner was 14.75 cts. per day.

The food of Finland peasants, S. SUNDSTRÖM (*Untersuchungen über die Ernährung der Landbevölkerung in Finnland. Helsingfors, 1908, pp. 230; rev. in Rev. Gén. Sci., 20 (1909), No. 5, p. 204; Biochem. Zentbl., 8 (1909), No. 10, p. 505*). According to the reported data, a man of medium weight and at moderate work consumes food furnishing 4,000 calories per day, whereas a woman consumes from 2,700 to 2,800 calories. In the case of the man, the average daily ration supplies 136 gm. protein, of which 84 per cent is digested. In the case of fats and carbohydrates, the coefficients of digestibility are 90 and 85 per

cent, respectively, while 87.5 per cent of the energy of the ration is said to be available.

Vegetable cookery and meat substitutes, SARAH T. ROREER (*Philadelphia, 1909, pp. 328*).—A collection of recipes and menus.

Reform in our diet, M. HINDHEDE, trans. by G. BARGUM (*Eine Reform unserer Ernährung. Copenhagen and Leipsic, 1908, pp. 232, pl. 1, figs. 4*).—In this translation into German from the Swedish it is stated that original new material has been incorporated in the main portion of the volume, and additional material has been added which has accumulated since the work was first printed. On the basis of the experience of himself, his family, and others, the author advocates a low proteid diet which in his own case consists of potatoes, bread, grits, fruit, and considerable fat, with small amounts of meat, eggs, etc. The bulk of the volume is taken up with summaries and discussions of literature bearing upon the subject. General suggestions are also made regarding the importance of air, exercise, and other similar hygienic measures.

Intracellular enzyms, H. M. VERNON (*London, 1908, pp. XI+240*).—The author has presented in this volume a course of lectures given at the Physiological Laboratory of the University of London on proteolytic endoenzyms, fat and carbohydrate splitting endoenzyms, zymase and other glycolytic enzyms, oxidizing enzyms, the constitution and mode of action of enzyms, reversible enzym action, and endoenzyms and protoplasm. Indexes are provided. Of the importance of the intracellular enzyms, or endoenzyms, and their relation to biological problems, the following statements are made:

"These enzyms differ from the exo-enzyms, such as are found in many of the secretions of living organisms, by reason of the fact that they are bound up in the protoplasm of the cells, and, so long as these cells retain their vitality, can only exert their activity intracellularly. On death of the cells, the protoplasm disintegrates, and many of the constituent enzym groupings gradually split off and pass into solution. It is inferred, though strict proof of the inference is wanting, that any zymolysing powers possessed by such solutions were, in all probability, possessed by the protoplasm before disintegration. And as a living tissue would scarcely elaborate and store up within itself enzyms which were useless to it, it is supposed that any enzym which can be extracted from a tissue after death—apart from such enzyms as may be secreted externally during life—was of functional importance during the life of the tissue. A thorough study of all the zymolysing powers possessed by the disintegration products of various typical tissues, vegetable as well as animal, is therefore of paramount importance, for the knowledge so attained may lead us far toward the explanation of the properties of living matter. It is possible that it may show us that many or most of the catabolic processes of living tissues, and perhaps the anabolic processes as well, are due to nothing more than the ceaseless activity of a vast variety of endoenzyms, bound up together in the biogens, and exerting their powers as they are needed. . . . This hypothesis of cellular metabolism is not at present by any means completely established on a sound experimental basis, but it is at least a working hypothesis, and one which can only stimulate research, not retard it. Hence, even if it ultimately prove erroneous, it needs no further justification. It is from the point of view of the probable validity of this hypothesis that the experimental data collected together in these lectures are described."

On the occurrence of a phytin-splitting enzym in animal tissues, E. V. MCCOLLUM and E. B. HART (*Jour. Biol. Chem., 4 (1908), No. 6, pp. 497–500*). From the results of their experiments the authors conclude that "the liver and blood have the property of cleaving the salts of phytic acid with the production of inorganic phosphoric acid. The wide distribution of inosit in the tissues

renders it impossible for us to say from experiments yet made whether this is also produced in this cleavage."

The effect of diet on the amylolytic power of saliva, C. H. NEILSON and D. H. LEWIS (*Jour. Biol. Chem., 4 (1908), No. 6, pp. 501–506, fig. 1*).—The results of experiments led the authors to conclude that "there is a change either in the amount of ptyalin or in its activity, or in the concentration of the saliva, which enables more or less starch to be digested with a given quantity of saliva according to the diet. . . . Whether this change in the amylolytic power of the saliva due to diet should really be called an adaption to diet is immaterial."

Concerning the so-called amid nitrogen of protein, Z. H. SKRAUP and E. VON HARDT-STREMAYR (*Monatsh. Chem., 29 (1908), No. 3, pp. 255–262*).—From the experimental data presented the authors conclude that the greater part of the amid nitrogen of protein is set free in the first cleavage process of the molecule which breaks it down into albumoses.

The physiological significance of creatin and creatinin, L. B. MENDEL (*Science, n. ser., 29 (1909), No. 745, pp. 584–591*).—A digest of physiological, chemical, and other data on the subject of creatin and creatinin, presented at the meeting of the Society of Physiology and Experimental Medicine, Baltimore, 1908.

Diet as a means of increasing vital resistance in tuberculosis, with special reference to the protein ration, J. H. KELLOGG (*Med. Rec. [N. Y.], 75 (1909), No. 7, pp. 253–263*).—The author concludes that vegetarian diet and low protein are conditions favorable to the treatment of tuberculosis.

Mineral metabolism of infants, L. F. MEYER (*Biochem. Ztschr., 12 (1908), No. 5–6, pp. 422–465, figs. 2*).—With food furnishing 40 to 50 calories per kilogram of body weight, and water in abundance, nursing infants were found to lose various organic and inorganic body constituents for a few days and then make small gains in these constituents with practically constant body weight.

The effect of adding casein and fat to the ration was a subject of special study.

ANIMAL PRODUCTION.

Metabolism of organic and inorganic phosphorus, F. C. COOK (*U. S. Dept. Agr., Bur. Chem. Bul. 123, pp. 63, pls. 3*).—The author reviews the work of previous investigators on this subject, and reports the result of feeding experiments with 4 rabbits lasting 5 months.

The food consisted of a ration of carrots, gluten, a mixture of starch and sugar, olive oil, and salt solution. To 2 of the rabbits organic phosphorus in the form of crude phytin was fed, and to the other 2 an equivalent amount of phosphorus in the form of disodium hydrogen phosphate and sodium dihydrogen phosphate. "The rabbits to which the inorganic salts were fed received daily 5 cc. of a standard salt mixture consisting of 450 gm. of sugar, 4 gm. of calcium chlorid, 15 gm. of sodium chlorid, 30 gm. of potassium chlorid, and 1 gm. of magnesium sulphate, made up to a volume of 2,000 cc. and containing 0.0492 gm. of phosphoric acid in the form of disodium hydrogen phosphate and sodium dihydrogen phosphate per cubic centimeter. The rabbits to which the organic phosphorus was fed received daily 5 cc. of a salt mixture made so as to supply an equivalent amount of the above mineral salts, allowance being made for the presence of calcium, magnesium, potassium, and phosphorus in the phytin."

The nitrogen and phosphorus balances were determined during a period of nearly 5 months. The inorganic phosphorus was estimated in the urine by the uranium-acetate titration method. During the last 4 weeks calcium, magnesium, and ether-alcohol soluble phosphorus (lecithin) balances were included.

At the end of the period the rabbits and also 2 normal rabbits were chloroformed and the different organs of the body analyzed. In all cases post-mortem examinations were made and slides of the various organs were made and histological changes noted.

The preliminary feeding period lasted 100 days, with the following results: One rabbit that received a larger amount of nitrogen than the others gained in weight. The total nitrogen ingested varied during a period of 7 days from 5 to 6.6 gm. of nitrogen per 1,000 gm. of body weight. More nitrogen was excreted in the urine of those fed organic phosphorus than in the case of those fed inorganic phosphorus. The amount of nitrogen eliminated in the feces varied with the individual rabbit from 9.3 to 14.6 per cent. The rabbits fed inorganic phosphorus retained a larger proportion of the absorbed nitrogen than did those fed organic phosphorus. The average amount of phosphoric acid ingested during 7 days per 1,000 gm. of body weight varied from 1.6 to 2.2 gm. From the average figures it appears that the rabbits fed organic phosphorus eliminated a smaller percentage of the ingested phosphoric acid in the urine than those fed on inorganic phosphorus. The ratio of nitrogen to phosphoric acid in the food was but slightly above 3:1, a much larger proportion of phosphoric acid than is usually fed in a normal diet. The ratio of nitrogen to phosphoric acid in the urine varied from 5:1 to 7.5:1, being higher in the case of the rabbits fed organic phosphorus owing to the relatively larger elimination of phosphoric acid in the urine of those fed inorganic phosphorus.

The principal feeding period lasted 4 weeks. The amount of nitrogen ingested and absorbed was quite uniform. The amounts excreted in the urine and feces varied considerably. The relation of urine nitrogen to urine phosphorus was highest in the case of the rabbits fed organic phosphorus. The ratio in the feces was very regular. A higher ratio of calcium to magnesium was noted in the feces of the rabbits fed inorganic phosphorus. This ratio varied considerably in the urine of the individual rabbits, as did also the ratio of phosphoric acid to calcium in the feces. The phosphoric acid to calcium ratios in the urine again showed more phosphorus eliminated by rabbits fed inorganic phosphorus than by those fed organic phosphorus. The ether-alcohol extracted phosphorus represented but a small proportion of the total organic combined phosphorus, and it is concluded that no ether-alcohol phosphorus is normally present in the urine even after the feeding of organic phosphorus.

"In the case of the rabbits fed organic phosphorus the average amount of calcium absorbed from the intestinal tract or metabolized was higher than in the case of those fed inorganic phosphorus. These figures agree with the theory that the calcium and phosphorus in the inorganic form unite to form the insoluble calcium phosphate which is eliminated by the bowels in an unchanged form." The amount of metabolized magnesium that was retained indicates that the rabbits fed inorganic phosphorus, while metabolizing a smaller amount of the magnesium than did those fed organic phosphorus, retained a larger percentage of the amount actually metabolized.

A post-mortem examination of the bones of the experimental rabbits showed that they formed a larger percentage of the body weight than in the case of normal rabbits and a higher content of ether-soluble matter. The livers of the rabbits fed on organic phosphorus for several months showed fatty degeneration as well as fatty infiltration. Of the livers of the inorganic phosphorus-fed rabbits one showed both fatty degeneration and fatty infiltration; the other, only slightly fatty infiltration. The livers were enlarged and contained considerably more nitrogen and phosphoric acid than normal livers when calculated to a water and fat-free basis. As compared with the normal rabbits, the brains and nerves of the rabbits fed on organic phosphorus yielded a larger percentage of ether-alcohol soluble phosphorus, while those of the rabbits fed

inorganic phosphorus yielded a smaller percentage. There was also a larger percentage content of ether-soluble material in the brains and nerves of the phosphorus-fed rabbits than is normal.

Investigation of neolithic bones of eastern Galicia, M. Dürr (*Ztschr. Landw. Versuchsw. Österr., 12 (1909) No. 2, pp. 77–86*).—Fossil bones of bison, horses, sheep, cattle, swine, goats, deer, beaver, and dog which were exhumed in 1908 from the remains of a neolithic settlement of the second century, B. C., are briefly described. Apparently the equine and probably the bovine specimens were those of domesticated animals, but the others were remains of wild species.

On the Irish horse and its early history, R. F. Scharff (*Proc. Roy. Irish Acad., 27 (1909), No. 6, Sect. B, pp. 81–86*).—In this discussion on the origin of the Irish horse the equine types in the Irish National Museum are compared with other types, and measurements of the museum specimens are given. The author thinks the domesticated Crannog horse, which dates back to the tenth century, is descended from the wild Shandon horse rather than from later imported horses of Spanish or eastern blood.

The heredity of secondary sexual characters in relation to hormones; a contribution to the theory of heredity, J. T. Cunningham (*Proc. Zool. Soc. London, 1908, III, p. 434*).—This is a paper read before the Zoological Society of London. The author criticises recent theories of the heredity of sex and restates Darwin's theory of pengenesis in terms of modern physiology. If hormones can pass from sexual organs into the blood it is suggested that conversely hormones from the soma might affect the gametes and so produce some heredity effect in succeeding generations. If this be so, the hormones would thus possess the characteristics of the theoretical pangens of Darwin.

Secondary chromosome-couplings and the sexual relations in Abraxas, E. B. Wilson (*Science, n. ser., 29 (1909), No. 748, pp. 704, 706*).—A discussion of the sex heredity theories of Wilson and Castle, previously noted (E. S. R., 20, p. 1071; 21, p. 71). The author cites here cases in which the Y-element is not the vehicle for the transmission of secondary male characters.

Sterility, H. Leeney (*Live Stock Jour. [London], 69 (1909), No. 1827, p. 387*).—The author calls attention to the increasing frequency of sterility in live stock which has been bred for special purposes, and thinks that many cases are due to influences which affect that portion of the spinal cord which lies within the sacrum. Some drugs have a special influence on this part of the cord, but it is not known how far such artificial excitation is desirable or how long fertility may be restored in this manner.

Fecundity of swine, F. M. Surface (*Biometrika, 6 (1909), No. 4, pp. 433–436, dgms. 2*).—Frequency curves were fitted to data previously reported (E. S. R., 18, p. 267), and analytical constants for variation of fecundity in brood sows of the Duroc Jersey and Poland China breeds were determined.

The chief constants for the Poland China are: Mean, 7.4353±0.01; median, 7.8754; mode, 7.2924; standard deviation, 2.038±0.013; coefficient of variation, 27.411±0.172; and skewness, 0.0701±0.01. The constants for the Duroc Jersey are: Mean, 9.3372±0.021; median, 9.7631; mode, 9.2064; standard deviation, 2.427±0.016; and coefficient of variation, 25.997±0.169. These constants are of considerable value because of the large number of litters dealt with. The coefficient of variation is somewhat lower than the average for other animals. The Poland China, with the smaller mean and larger variation, shows a slightly larger skewness. A difference in the value of the means of almost 2 pigs in favor of the Duroc Jersey confirms the common observation that this breed is very prolific.

A short account of an experiment in crossing the American bison with domestic cattle, M. M. Boyd (*Amer. Breeders' Assoc. Proc., 4 (1908), pp.*

324–331, figs. 4).—A bison bull was mated with pure-bred cows of the Polled Angus, Hereford, West Highland, Sussex, and Devon breeds, with Polled Angus and Galloway grades, and with scrubs.

The tentative list of dominant characters which appeared in the hybrids is as follows: The white face of the Hereford, polled head of the Angus, voice of the bison, white hind and forequarters of the beef breeds, and the gradual shedding of the coat of domesticated cattle. The body color of the bison was usually dominant. The hump of the bison was inherited, but in a modified form. The length and quality of fur were intermediate. The period of gestation varied from 244 to 277 days, with an average of 264. There were 59 successful births and 63 abortions. The hybrids are larger, yield larger carcasses of beef, and have a pelt which appears to be of more value than that of the pure bison.

Data on variation in the comb of the domestic fowl, R. and MAUD D. PEARL (*Biometrika, 6 (1909), No. 4, pp. 420–432, figs. 97*).—In this article the authors endeavor to give a quantitative description of the nature and amount of variation in the form and size of the comb normally occurring in a homogeneous pure-bred strain of Barred Plymouth Rock hens. Apparently there is a continuous variation in every definable characteristic of the comb. The extraordinary degree of variation which exists even within a single comb type is illustrated by figures, and the frequency distributions for variation are presented in tabular form. In hybridizing experiments with single and pea comb crosses results were similar to those found by Davenport (E. S. R., 20, p. 1072).

On the inheritance of color in domestic pigeons, with special reference to reversion, R. STAPLES-BROWNE (*Proc. Zool. Soc. London, 1908, I, pp. 67–104, pls. 4; abs. Ztschr. Induktive Abstam. u. Vererbungslehre, 1 (1909), No. 4, pp. 395, 396*).—In these experiments the greater number of matings were between the black Barb and the white Fantail, a cross originally made use of by Darwin and by which he obtained a breed nearly identical to *Columba livia*. In the first generation the birds were all black except a few white feathers. In the second generation blacks, whites, reds, and blues appeared.

"The black element is dominant or epistatic to the blue and must be regarded as not derived from the wild pigeon but added to it by some subsequent variation. . . . The F 1 generation shows a dominance of black to white. . . . The blue type may be homozygous or may be dominant to white. Black was never obtained by the mating together of two blues. The mating of blues and blacks shows that blue is a simple recessive to black. . . . A majority of reds produced in a F 2 generation and from subsequent matings showed a bluish tail with a very distinct bar, the end parts also having a bluish tinge. . . . Red has shown itself to be recessive to both black and blue but dominant to white." With Barb-Nun crosses no blue birds were produced.

"A cross between a white Tumbler and a white Fantail gave an interesting result. The F 1 birds were either pure white or showed a few colored feathers. Two of the latter bred together gave whites, 'ticked whites,' and tricolors. The appearance of these colored birds in F 2 points to the white Tumbler being a dominant white."

Studies were also made of the irides, beaks, claws, and eye wattles. There is a marked correlation between the black iris and the black plumage, and to a lesser degree between the black plumage and the white iris. Pigment in the beak and claws is correlated with certain types of plumage. The red wattle appeared to be dominant over the flesh-colored.

[**Analyses of feeding stuffs**], R. E. ROSE and A. M. HENRY (*Fla. Quart. Bul. Dept. Agr., 19 (1909), No. 2, pp. 80–89*).—Analytical data are reported of

cotton-seed meal, wheat bran, cottonhead hay (*Frælichia floridana*), kudzu vine stems, corn and velvet bean chops, and many mixed feeds.

Inspection of commercial feed stuffs, P. H. SMITH and P. V. GOLDSMITH (*Massachusetts Sta. Bul. 128, pp. 3–56*).—This bulletin contains analyses of commercial feeding stuffs found in the Massachusetts markets during the year 1908, together with such comments as are called for by the results of the inspection. The principal products analyzed were cotton seed, linseed, corn, Kafir corn, hominy, and alfalfa meals, rice, flax, gluten, and molasses feeds, distillers' and brewers' grains, malt sprouts, wheat bran and middlings, meat scraps, poultry and mixed feeds. Attention is called to the growing tendency on the part of the manufacturer of certain feeding stuffs to incorporate in the products weed seeds, grain screenings, and other low-grade material.

Under the title, The Dairyman and the Grain Problem, J. B. Lindsey suggests grain rations that may be used for milk production. There is a tabulated list of the wholesale cost of feeding stuffs for the year.

Composition of feeding stuffs on the Canadian market, F. T. SHUTT (*Ottawa: Govt., 1909, pp. 21–42*).—Analyses of corn, wheat, oat and pea products, cotton-seed and linseed meals, flax refuse, molasses feeds, and other feeding stuffs are reported.

The feeding of cotton-seed meal and hulls, A. M. SOULE (*Columbia, S. C. [1908], pp. 52, figs. 12*).—This is a popular exposition of the use of cotton-seed meal and hulls as feeds for stock, and includes the results of many feeding tests with cattle, sheep, and hogs which were made at various State experiment stations.

A successful poultry and dairy farm, W. J. SPILLMAN (*U. S. Dept. Agr., Farmers' Bul. 355, pp. 40, figs. 7*).—This bulletin describes in detail the methods practiced on a farm in Jefferson County, Washington, which was hewn out of the timber by the owner and his family and farmed by them for 18 years practically without outside help.

The principal products sold are butter, eggs, and poultry. At the present time 33 cows and 700 hens are kept. About 35 to 40 hogs are butchered each year. The principal crops raised are potatoes, roots, wheat, clover, English rye grass, rye, barley, and oats. No corn is grown as it does not do well under the prevailing conditions. Clover and English rye grass are the main silage crops. On the drier fields orchard grass is sown instead of rye grass. Peas and oats were formerly used for silage, but the past few years the peas have failed. Experiments with vetch as a substitute for peas have been made, and it has been found satisfactory. One year the silo was filled with barley on account of a failure with peas. A neighboring farmer makes silage of barley without a silo by simply covering the green material with 18 in. of earth. The annual income from this farm of 80 acres is about $5,000.

Experiments in raising calves, H. THIEL (*Landw. Jahrb., 37 (1908), Ergänzungsb. 3, pp. 228–235*).—Feeding experiments with proprietary calf feeds are reported. Three years' experience with denatured starch have proved it to be a useful substitute for milk fat in calf raising.

The breeding tendencies of the black spotted low-country cattle in the Province of Posen, Z. JERZYKOWSKI (*Die Zuchterfolge des Schwarzbunten Niederungsrindes in der Provinz Posen. Inaug. Diss., Univ. Breslau, 1907, pp. 88, figs. 3; abs. in Milchw. Zentbl., 4 (1908), No. 12, p. 541*).—The agricultural and cattle industry of Posen is briefly described. From measurements of 97 animals of the Oldenburg breed and of 59 of the East Friesian, the author finds that since their introduction into the Province of Posen these breeds have been somewhat reduced in size and approach more closely the form of a general purpose animal than the original stock.

Sheep and lambs in Tennessee, F. C. Quereau (*Tennessee Sta. Bul. 84, pp. 15–24, map 1; Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 89–98, map 1*).—This is a preliminary report on lamb production for the early market. Methods of breeding and feeding are described and the market demands for the Easter lamb are discussed.

The sheep industry in Nova Scotia, J. B. Spencer et al. (*Ann. Rpt. Sec. Agr. Nova Scotia, 1907, pt. 1, pp. 67–156, pls. 12, figs. 5*).—This consists of a series of articles on the various phases of the sheep industry.

Feeding experiments with swine, H. Thiel (*Landw. Jahrb., 37 (1908), Ergänzungsb. 3, pp. 203–228*).—This article reports the feeding experiments which have been in progress since 1903.

Sugar chips when fed at the rate of 1:1.5 kg. per day have proved to be an excellent feed, but are less economical than dried potatoes. Barley when fed alone was a better feed than maizena feed or when mixed with maize or maizena feed. It increased slightly the cost of gains when fed as a supplement to potato flakes or to potato flakes and meat meal. Potato flakes made more economical gains than beets.

On the influence of feeding stuffs on the properties of fat and lean meat in swine, K. Popowitsch (*Über den Einfluss der Futtermittel auf die Beschaffenheit des Fleisches und Fettes bei Schweinen. Inaug. Diss., Univ. Halle, 1908, pp. 71; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 3, p. 139*).—Ten pigs were fed a basal ration of potatoes and skim milk. To this was added at different times barley, maize, peas, and sesame oil meal, but without effect on the composition of lean meat. The composition of the fat varied according to the nature of the feed. The oils from maize, peas, and sesame being rich in olein increased the olein content of the body fat.

American poultry culture, R. B. Sando (*New York, 1909, pp. IX+265, pls. 39, fig. 1, dgm. 1*).—The information contained in this practical treatise on poultry culture is based upon the author's experience. It is prepared especially for the beginner and for those who wish to keep small flocks, although the methods recommended can be applied to poultry keeping on a more extensive scale.

[Statistics of live stock in New Zealand] (*Statis. New Zeal., 1907, vol. 2, pp. 469–476*).—These are tables showing the increase in the number of live stock of several provincial districts of New Zealand since 1858.

DAIRY FARMING—DAIRYING.

Comparison and improvement of dairy herds in Tennessee, S. E. Barnes (*Tennessee Sta. Bul. 83, pp. 3–12, figs. 4; Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 73–83, figs. 4*).—This is a report of the work of the station in cooperation with the Dairy Division of this Department. The records of 12 typical dairy herds are tabulated. The best herd averaged 307.5 lbs. of butter fat per cow per year, valued at $92.25. The poorest herd averaged 177.8 lbs. of butter fat per cow per year, valued at $53.36. One cow made a profit of $86.32, whereas another was fed at a loss of $4.55. The advantages to be gained by improving the stock and feeding home-grown feeds are pointed out.

Tests with different breeds of cows, H. Thiel (*Landw. Jahrb., 37 (1908), Ergänzungsb. 3, pp. 236–324*).—This is a detailed report of experiments with 14 Red Holstein, 15 Angler, and 14 Wesermarsch cows, and is a continuation of work previously reported (E. S. R., 18, p. 766).

The Red Holsteins on an average weighed 602 kg. and produced during 1 year 5,685 kg. of milk and 186.1 kg. of butter fat. The Angiers averaged 443 kg. in weight, produced 5,222 kg. of milk and 183.4 kg. of butter fat. The Wesermarsch cows averaged 570 kg. in weight, produced 5,423 kg. of milk and 175.5 kg. of butter fat.

The data concerning the amount of feed eaten are submitted in detail, together with descriptions and measurements of the individual cows. The results of these experiments are compared with similar data for other breeds.

Feeding experiments with milch cows, H. THIEL (*Landw. Jahrb., 37 (1908), Ergänzungsb. 3, pp. 171–203*).—In these experiments the basal ration consisted of meadow hay, beets, and peanut meal, and the feeding stuffs tested were barley, oats, rye, maize, wheat bran, rye bran, rice-feed meal, and maizena.

As in earlier experiments (E. S. R., 18, p. 765), the feeding stuffs were found to exert specific effects on the amount and chemical composition of milk independent of their nutrient constituents. The work since 1903 is summarized. Maizena, and in a less degree, maize and oats, increase the amount of milk but decrease the percentage of fat, so that the total amount of fat remains about the same. Feeds like palm-nut cake and cocoanut cake increase the amount of fat, but poppy-seed cake and rice-feed meal decrease it. The other feeds did not influence the amount of fat so perceptibly, but linseed cake, rape-seed cake, sesame cake, and cotton-seed cake are deemed slightly more favorable for fat production than peanut cake. Wheat bran was a somewhat better feed for cows than rye or rye bran.

The effect of feeding beet leaves on the composition of milk fat, H. LÜHRIG, A. HEPNER, and G. BLAU (*Pharm. Zentralhalle, 50 (1909), No. 14, pp. 275–282*).—Experiments along the lines previously noted (E. S. R., 19, p. 1010), were continued, and indicate that the feeding of beet leaves increased the Reichert-Meissl, saponification, and Polenske values, but lowered the index of refraction and the iodin number.

The milking machine as a factor in milk hygiene, E. G. HASTINGS and C. HOFFMANN (*Centbl. Bakt. [etc.], 2. Abt., 22 (1908), No. 7–10, pp. 222–231, fig. 1*).—This article has been substantially noted from another source (E. S. R., 20, p. 77).

Some studies of the physiological leucocyte content of cow's milk, B. H. STONE and L. P. SPRAGUE (*Jour. Med. Research, 20 (1909), No. 3, pp. 235–243, figs. 2*).—Parallel leucocyte counts were made of the blood and milk from 57 cows. The authors found that the number of leucocytes in the blood varied between 6,000 and 10,000 per cubic centimeter, but was subject to no such variation as the milk leucocyte content. There was no relation between the general blood condition and the leucocyte content of the milk. Apparently in certain cows there is a tendency to a high leucocyte content over a considerable time. Leucocyte counts were also made of the milk of 2 healthy Jersey cows during the entire lactation period.

"The results of this work have tended to shake our confidence in an arbitrary numerical leucocyte standard as a reliable criterion of the sanitary fitness of milk when taken from single cows, yet we do believe that the physiological average is considerably below 500,000—only 1 per cent of the counts made by us were above this number—and that very seldom would the count of the mixed milk of 10 or more cows go above this figure unless there were present abnormal conditions in some of the animals. With the 2 cows selected by us, the average was above 500,000 only 3 times in a total of 538. It is fair to presume that the additional introduction of one or more normal cows into the series would have materially lowered the percentage, as there seems to be no relation between the high counts in the milk of the 2 cows when kept on regular diet."

The authors describe a new tube for quantitative and qualitative analyses of milk sediments.

The physiological and therapeutical properties of the serum of milk, R. BLONDEL (*Lancet [London], 1909, I, No. 15, pp. 1038–1040*).—This article is

a translation of a memoir communicated to the Paris Academy of Medicine April 9, 1909.

Subcutaneous injections of a serum of cow's milk from which the bacteria had been removed by filtering increased the number of polynuclear leucocytes and the excretion of uric acid and lowered the blood pressure. This last property suggested the use of milk serum in therapeutics, but its action so far has been uncertain except in cases of arterial hypertension in arterio-sclerosis. In 62 out of 63 cases of this nature the fall of blood pressure was constant and there was a mitigation of the subjective symptoms, such as headache and insomnia. The methods of preparation and use are described.

Ultramicroscopic investigations on the behavior of casein suspension in fresh and in coagulated milk, A. KREIDL and A. NEUMANN (*Arch. Physiol. [Pflüger], 123 (1908), No. 9–10, pp. 523–539; abs. in Milchw. Zentbl., 5 (1909), No. 2, pp. 83, 84*).—Ultramicroscopic particles composed of casein are found in the milk of the cow, dog, cat, rabbit, guinea pig, elephant, horse, goat, and rat, but are absent in human milk unless acid is added. In the goat, rabbit, and dog they are found in the colostrum. In the cat they are found only from 24 to 36 hours after parturition. On coagulating these particles adhere in clusters. The number of particles is increased upon shaking with ether or centrifuging, and decreased when enough alkali is added to neutralize the acidity.

The action of acids on the coagulation of milk by vegetable rennets, C. GERBER (*Compt. Rend. Acad. Sci. [Paris], 146 (1908), No. 21, pp. 1111–1114; abs in Jour. Chem. Soc. [London], 94 (1908), No. 551, I, p. 745*).—The action of vegetable rennets that coagulate boiled milk more readily than fresh milk is retarded by the addition of small quantities of citric, succinic, butyric, phosphoric, and hydrochloric acids and accelerated by larger quantities. In the case of rennets that curdle fresh milk more quickly than boiled milk, the above named acids, except citric, accelerate the action. Citric acid retards the action except in small quantities.

The chemical composition of tuberculous milk, A. MONVOISIN (*Hyg. Viande et Lait, 3 (1909), No. 4, pp. 145–150; abs. in Rev. Gén. Lait, 7 (1909), No. 12, p. 285*).—When compared with normal milk tuberculous milk contains a larger percentage of nitrogen and ash but less fat, sugar, dry matter, and acidity.

Milk fat of goats, M. SIEGFELD (*Milchw. Zentbl., 5 (1909), No. 1, pp. 13–15*).—The author made a number of analyses of the milk fat of goats. The Reichert-Meissl number ranged from 23.95 to 26.85, the Polenske number from 4.60 to 7.10, the iodin value from 25.1 to 29.2, and the saponification value from 235.1 to 242.2. Other determinations were also made and reported.

Fishy flavor in butter, L. A. ROGERS (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 146, pp. 20, figs. 2*).—This is an investigation into the cause of the fishy flavor, a peculiar oily taste suggesting mackerel or salmon, sometimes present in butter.

The trouble is of widespread occurrence and most noticeable in fresh butter during hot weather. Contrary to the results reported by O'Callaghan (E. S. R., 13, p. 179; 18, p. 1078), a fishy flavor could not be produced by inoculation with *Oïdium lactis*. A biological study was made of farms, but no condition was found in the pastures and on the farms furnishing milk from which fishy butter was made which did not exist on some of the farms producing normal butter. This applied to the water supply as well as to the flora of the pastures. These results seemed to exclude the possibility of any direct connection between the feed of the cows and the presence of the fishy flavor in the butter. Fishiness could not be produced in butter made under winter conditions by any combination of circumstances. Bacteriologically, the only peculiarity of the cream from

the farms where the fishy flavor was developed was the presence of very active lactic-acid bacteria.

"In all cases in which the records were complete it was found that those experimental butters which became fishy were made from high-acid cream. Fishy butter was made from cream acidified with lactic and acetic acids. However, cream with high acidity does not uniformly develop fishiness." It was apparent that acidity although having a determining influence on the fishy flavor was not its sole cause. The effect of overworking butter was next investigated, and it was observed that fishiness occurred only in a combination of high acidity and overworking. Further experiments in this line showed that overworking improved rather than impaired the flavor of the unripened cream butter, but evidently hastened the appearance of the fishy flavor in the ripened cream butter. The increased amount of air by overworking was determined with Barcroft's apparatus, a description of which is given.

"In the opinion of the writer, fishy flavor is caused by a slow, spontaneous, chemical change to which acid is essential and which is favored by the presence of small amounts of oxygen. Fishy flavor may be prevented with certainty by making butter from pasteurized sweet cream. Butter made from pasteurized sweet cream with a starter but without ripening seldom if ever becomes fishy."

The use of starters in butter making, F. W. Bouska (*Iowa Sta. Bul. 103, pp. 217–229*).—This bulletin reports experiments with starters and contains general information on their use in butter making.

The acidity of milk, diluted milk, and milk to which milk sugar, brown sugar, and glucose had been added, whey, whey and ground casein, and various mixtures of chalk, peptone, glucose, bicarbonate of soda, and potassium hydrogen phosphate are tabulated. "The whey produced about the same acidity (0.36 per cent) as the sugar solution containing 5 to 10 per cent milk (0.2 to 0.3 per cent). But the whey and curd produced nearly as much acid (0.59 per cent) as the milk (0.74 per cent). Therefore the casein favors the development of acid." The acidity was low when sugar or a base was lacking. In mixtures containing sugar, protein, and a base the acidity was as high as in milk. The casein of sweet milk fulfills the office of a base.

"The use of chalk in deep vessels of starter is not feasible because it settles to the bottom. Theoretically, bicarbonate of soda seemed better suited. . . . Potassium hydrogen phosphate was substituted for the bicarbonate of soda to test the effect of a phosphate. Six trials gave no more acid than was usually developed in the same mixture without the phosphate. Glucose solutions containing small quantities of sodium hydroxid did not favor the development of acid."

Practical tests were made with glucose and condensed milk starters. "The low acidity of the glucose starters gives them weak tastes. They contain about as many bacteria as a milk starter and require from 2 to 3 times as much time to ripen cream. The flavor of the glucose starter butter is practically as good as that of milk starter butter. Reckoning milk at $2 a hundredweight and glucose at 10 cts. a pound, the material for 100 lbs. of glucose starter costs 50 cts." Condensed milk gave the best results when diluted with 3 to 4 parts of water.

Starters were carried in pasteurized and in sterilized milk, but the results were not conclusive. It is stated that the flat flavor frequently noticed in the early stages of ripening is probably caused by enzyms acting on the casein. It was found that it had been introduced accidentally by neutralizing the starter with ammonia, and that ammonium lactate has this flat flavor. In a study of overripening of cream it was found that the increase of *Oïdium lactis* had a more direct relation with bad flavors than did the numbers of putrefactive bacteria.

A study of South Dakota butter with suggestions for improvements, C. LARSEN and J. H. SHEPARD (*South Dakota Sta. Bul. 111, pp. 453–482*).—This bulletin reports results of a cooperative butter contest which was instituted with a view of improving the quality of South Dakota butter.

"Each competitor, representing a creamery, sent at 6 different times, representing different seasons of the year, a 20-lb. tub of butter to the experiment station, at which place the butter was scored by competent judges. . . . One hundred and fifty-seven samples of butter, representing 35 different creameries in different parts of the State, were examined and analyzed." The average composition of the samples of butter was as follows: Fat 84.65, water 12.29, salt and ash 1.77, and protein 1.3 per cent. The average rating was 91.58 at the station and 89.2 when rejudged at Chicago.

Suggestions are given for improving butter by better methods on the farm and in the creamery.

Principles and practice of butter making, G. L. MCKAY and C. LARSEN (*New York and London, 1908, 2. ed., rev. and enl., pp. XIII+351, pls. 7, figs. 177*).—In this new edition (E. S. R., 17, p. 696) chapters on cooling facilities for creameries and on the economic operation of creameries have been added.

Buttermilk cream, E. H. FARRINGTON (*Hoard's Dairyman, 40 (1909), No. 7, p. 218; N. Y. Produce Rev. and Amer. Cream., 27 (1909), No. 26, p. 1090*).—This new product is made by heating buttermilk to a temperature of 120° F. until it begins to whey off. After the whey has been thoroughly drained out the curd is mixed with skim or whole milk and has the appearance of whipped cream. It is claimed that the creamy consistency and the buttermilk flavor make it as attractive a dish as Devonshire cream.

The relation of different acids to the precipitation of casein and to the solubility of cheese curds in salt solution, J. L. SAMMIS and E. B. HART (*Jour. Biol. Chem., 6 (1909), No. 2, pp. 181–187*).—This is a record of observations on coagulations of lime-water casein solutions with lactic, oxalic, acetic, and phosphoric acids at different temperatures, together with the solubility of the precipitates in salt solutions. The tabulated data show that the quantity of acid required varies with the temperature and the kind of acid used and the age of the casein solution. The degree of solubility of the curd depends upon the kind of salt used and on the concentration in which it is employed.

"The phenomena of milk coagulation and salt solubility of cheese curds are affected by conditions of temperature, concentration, and by the presence of many substances in solution, and with the discovery of new facts the older explanations of these phenomena become increasingly inadequate and incomplete."

The elementary composition of different caseins, F. TANGL (*Arch. Physiol. [Pflüger], 121 (1908), No. 8–10, pp. 534–549; abs. in Milchw. Zentbl., 5 (1909), No. 2, p. 83*).—The author made determinations of the different chemical elements in the casein of the milk from the cow, buffalo, sheep, goat, horse, and ass. The results show some individual variations, yet there is in general a close agreement.

Report on the investigations of the chemistry of milk and milk products during the second half year 1908, GRIMMER (*Milchw. Zentbl., 5 (1909), No. 2, pp. 49–67*).—A digest of the literature on this subject.

VETERINARY MEDICINE.

The vet. book, F. T. BARTON (*New York and London [1908], pp. XXXV+143, pls. 11, figs. 24*).—This is a small guide in which a brief account is given of the commoner ailments and accidents of domestic animals.

The poison weed problem in the arid West, G. H. GLOVER (*Amer. Vet. Rev.*, *34 (1909), No. 4, pp. 493–502, figs. 3*). This is considered the greatest problem with which stockmen have to deal in the arid region. Attention is called to the many obstacles to be met with in poisonous plant investigation. It is shown that some animals are more susceptible than others, that some plants are poisonous only at certain stages of growth, and that there are variations in the poison content of the plants according to the season, climate, etc.

Some cases of diabetes in animals, BRU (*Rec. Vét. [Toulouse]*, *33 (1908), No. 10, pp. 619–624*).—Two cases in cows and 3 in dogs are reported.

Some properties of tubercle bacillus cultivated on bile, H. CALMETTE and C. GUÉRIN (*Compt. Rend. Acad. Sci. [Paris]*, *147 (1908), No. 26, pp. 1456–1459*). The authors found that experiments with tubercle bacilli in which cultures in glycerin media (gelatin, potato, and bouillon) were used gave different results than those from natural infection such as infections produced by the ingestion or injection of milk or finely divided tuberculous organs. They also found the bacillus to grow perfectly on pure bile with 5 per cent of glycerin (sterilized), and that after several successive cultures on this medium it acquires very distinct physiological characters. Details are given of the mode of working and of the appearance and properties of the bacillus thus obtained. It is readily absorbed through the wall of the digestive tract and when it has penetrated in sufficient quantity in this way it can produce lesions with rapid calcification such as could never be obtained experimentally with cultures in ordinary glycerin media.

The conjunctival tuberculin reaction in cattle, K. WÖLFEL (*Berlin. Tierärztl. Wchnschr., 1908, No. 21, pp. 369–372*).—The author briefly reviews the work of others on the subject and reports in tabular form the results which he has obtained from the application of the test to 16 cattle. He finds that not all of the animals which react to the subcutaneous injection of tuberculin give the conjunctival test. The subcutaneous injection of tuberculin does not have any important influence upon the following conjunctival reaction. The best time for the observation is from 12 to 18 hours after the introduction of tuberculin. There was no elevation in temperature as the result of the conjunctival reaction.

On the intradermal reaction to tuberculin in animals, G. MOUSSU and C. MANTOUX (*Compt. Rend. Acad. Sci. [Paris]*, *147 (1908), No. 11, pp. 502–504*).—The authors advocate a method of tuberculin testing which consists in injecting a stated dose of tuberculin into the thickness of the skin. This has been designated as the "intradermo" reaction. It is applicable to all the domestic animals, and the indications of its positive results are readily perceived. The injection has no effect upon healthy animals. The authors conclude that this reaction is more simple, more practical, and less dangerous in its ulterior effects than the subcutaneous test, of which, however, it preserves all the advantages. It is free from the inconveniences and the possibilities of error which attend the ophthalmic and the cuti reactions. For these reasons the authors think that it should supplant the other methods.

The value of tuberculin in the control of tuberculous herds, V. A. MOORE (*Amer. Vet. Rev., 34 (1909), No. 4, pp. 503–511*).—A paper presented by the author at the International Congress on Tuberculosis, held at Washington, D. C., October, 1908.

Data have been collected of tests made in New York State of 683 herds (12,721 animals). As there is a considerable oscillation of the morbid process between an active and an arrested condition, it appears very necessary that cows from infected herds be retested if they have failed to react. There is shown to be

considerable danger in building up herds with nonreacting animals taken from herds in which there is tuberculosis.

The problem of bovine tuberculosis control, M. H. REYNOLDS (*Amer. Vet. Rev., 34 (1909), No. 4, pp. 449–481*).—This is an address presented at the International Congress on Tuberculosis, held at Washington, D. C.

A review is given of the work against the disease in Minnesota, Pennsylvania, Wisconsin, and Massachusetts. In the conclusions drawn from the study of conditions in these States, the author considers that the more important advances made have been the education of the public and the enlistment of a favorable opinion. In the discussion of eradication the author uses Minnesota as an illustration of the general problem. A plan is suggested for control work.

The admission of Canadian store cattle into this country: What are the dangers? H. A. WOODRUFF (*Vet. Rec., 21 (1908), No. 1068, pp. 417–419; 21 (1909), No. 1069, pp. 432, 433*).—In view of the demand for a revision of the stringent regulations in respect to the admission of live cattle into Great Britain from abroad, the author here considers the possible danger from free importations from Canada. The diseases discussed are contagious bovine pleuro-pneumonia, foot-and-mouth disease, mange, tuberculosis, and Texas fever.

Investigations on the occurrence and frequency of streptococcic mastitis in cows, G. RÜHM (*Wchnschr. Tierheilk. u. Viehzucht, 52 (1908), No. 7, pp. 125–130; abs. in Berlin. Tierärtztl. Wchnschr., 1908, No. 50, p. 902; Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 62, 63*).—Aside from tubercle bacilli, streptococci are probably the pathogenic organisms most frequently found in milk. They are often present, and since they are regarded by many medical men as a cause of infant mortality, the consumption of milk containing them must be considered dangerous for young children.

Experiments were carried out by the author in order to test Trommsdorff's method of determining the quantity of leucocytes present in milk. Five out of 16 cows in one stable were found to be affected with streptococcic mastitis. The author considers the processes in the development of the disease to be as follows: During the incubation period the streptococci increase in numbers without, however, causing any injury to the substance of the udder. As the bacterial products accumulate, however, inflammatory symptoms develop and leucocytes are poured out in increased quantity. Whenever the leucocytes increase in numbers to any great extent they immediately constitute an infallible indication of commencing inflammation. As milking removes the streptococci and their toxins, as well as the leucocytes and the antitoxins, it prolongs the course of the disease and renders the clinical symptoms less marked until the affected quarter gradually loses its function.

Lung sickness or contagious pleuro-pneumonia of cattle, J. M. CHRISTY (*Transvaal Agr. Jour., 7 (1909), No. 26, pp. 199–201*).—Although nearly every South African farmer has had experience with this disease, the Transvaal is to-day practically free from it. Cattle from a colony in which lung sickness exists are not allowed to enter the Transvaal unless certified by a government veterinary surgeon to be free from the disease and to come from a property where contagion of animals has not existed for at least three months prior to the date of such certification. A brief account is given of the occurrence of the disease in other countries.

Hemorrhagic spotting [cavernous angioma] of the liver in bovine animals, P. CHALSSÉ (*Rec. Méd. Vét., 85 (1908), No. 21, pp. 704, 715, figs. 2; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 56, 61*).—"Hemorrhagic spotting of the liver is common in cows, much rarer in oxen, and never occurs in calves or in other animals slaughtered for meat. No theory hitherto advanced regarding its pathogeny appears satisfactory. The predominance of the portal

lesions, the uniform distribution of patches throughout the liver, and the relation between certain hemorrhages and the divisions of the portal circulation suggest that the causative agent is carried by these venous channels; this cause is a toxic principle, either present in the food or of microbic character, more in our opinion due to microbes which produce a change in the tone of the capillaries and favors their walls yielding under the influence of blood pressure.

"This latter manner seems to us more probable. One knows that temporary attacks of enteritis, which are much more common in animals that are overfed, such as milch cows, have a well-marked action on the liver in consequence of the absorption of toxins or of microbes.

"We can not say that the agent isolated by us has any etiological rôle whatever, experimentation being nearly impossible from this point of view. In regard to the inspection of meat we believe that one can without danger consume the livers unless they show general change; those which have undergone marked change should be destroyed."

Hemorrhagic septicemia or pasteurellosis of cattle, F. HUTCHINSON (*Natal Agr. Jour., 11 (1908), No. 12, pp. 1534–1539*).—This is a general account of the disease in which the results of a post-mortem examination of an affected cow are included.

A practical demonstration of a method for controlling the cattle tick, W. D. HUNTER and J. D. MITCHELL (*U. S. Dept. Agr., Bur. Anim. Indus., Circ. 148, pp. 4*).—This circular deals with a demonstration of a method for controlling the cattle tick that was carried out by the Bureau of Entomology of this Department under practical conditions. The object of this demonstration was not so much to exterminate the tick as to bring it under control and avoid as far as possible the heavy expense of dipping cattle.

In a pasture of about 30,000 acres located in the northeastern portion of Victoria County, Texas, an area of about 1 mile square was fenced off, the most brushy and, according to the owner, the most "ticky" part being purposely chosen. On the completion of the fence, July 25, 1907, the cattle were all removed and rigidly excluded until December 12—that is, 140 days later. From the herd in the main pasture 65 head were then taken at random, dipped in a vat filled with a proprietary "tickicide," and placed in the demonstration pasture, there remaining undisturbed through the winter. In an examination of the cattle on June 26 a total of 7 ticks were found on 4 animals. These are supposed to have been the progeny of individuals which dropped from the outside cattle near the fence.

In order to determine the longevity of the progeny under favorable conditions, engorged ticks were placed in glass tubes about the time of the removal of the cattle from the demonstration pasture, August 1. The seed ticks were all found to be dead 120 days after the engorged ticks were placed in the tubes.

It is believed that equally successful results can be obtained by any cattle raiser in the South from the methods used in this demonstration with slight modifications.

The Natal spraying device, H. WATKINS-PITCHFORD (*Natal Agr. Jour., 11 (1908), No. 12, pp. 1576–1580, pls. 3*).—The author presents plans and photographs of a spraying device for use in destroying ticks and other ectoparasites. While the merit of portability can not be claimed for this device, it is simple of construction.

Poisoning from gnat bites, P. WIGAND (*Berlin. Tierärztl. Wchnschr., 1908, No. 48, pp. 858, 859; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 54–56*).—During the past 10 years 2 species of gnats, *Simulium reptans* and *S. ornata*, have attracted attention among breeders and veterinary surgeons. Recently they have appeared in enormous numbers and caused exten-

sive losses among grazing herds in East Prussia, Hanover, Sweden, and East and West Havelland.

During the process of sucking blood the gnats inject into the punctured wound a minute quantity of poison which, like snake poison, is derived from the salivary glands and is probably albuminous in character. The symptoms of gnat poisoning are peculiar and the condition can scarcely be confused with any other disease. The two most marked symptoms, which never coexist in the same way in any other disease, are the disturbance of circulation and the falling of body temperature. Oxen which were overcome by great clouds of gnats died with signs of rapid loss of strength within 24 to 36 hours, but death may occur within half an hour. Some observers believe a fatal termination in such cases to be due to the swelling of the air passages, but in the writer's opinion death results from heart failure.

No fatal case was ever seen among cattle grazing more than 3 miles from the bank of a river. In Germany the swarms usually appear between the end of April and the beginning of May; in rare cases between the end of July and the beginning of August. Animals when attacked should be removed to the stable as soon as possible. According to their condition they should receive from 1 to 3 pts. of brandy in double that quantity of water. When the condition is very serious ½ to 1 pt. of brandy should be given every hour or every 2 hours until improvement is noticeable.

Notes on the presence of two stomach worms in calves hitherto unrecorded in Australia, S. Dodd (*Queensland Agr. Jour., 21 (1908), No. 4, pp. 197, 198*).—In a post-mortem examination made by the author on a calf, following typical symptoms of stomach worm infestation, *Strongylus cervicornis* and *S. gracilis* were found in the fourth stomach in large numbers, together with the twisted stomach worm (*Hæmonchus contortus*).

Stomach worm disease of sheep and young cattle, M. R. Powers (*South Carolina Sta. Bul. 142, pp. 3–19*).—The stomach or twisted wireworm (*Hæmonchus contortus*), which has long been recognized as a grave menace to the sheep-raising industry, now seems to be also a serious obstacle to cattle raising in some parts of the South. During the fall of 1904 a considerable loss of young cattle was reported from 11 counties in South Carolina (E. S. R., 17, p. 913), and its presence has been reported each succeeding fall.

The disease is not confined to the southern portion of the State where the land is low, but it occurs also in the hilly pastures of the upcountry. These pastures, however, usually have small streams flowing through them, the low marshy banks of which furnish ideal conditions for the development of stomach worms.

Lambs are very susceptible to stomach worm disease and as the result sheep raising in some localities is almost impossible. Quite frequently young cattle are also affected. That calves on a milk diet appeared less susceptible to this disease is deemed probably due to the additional nourishment received from the milk, as well as to the fact that these calves do not graze as much as other animals and therefore take fewer worms into the stomach.

The disease is caused by large numbers of the worms occupying the fourth stomach. These worms are supposed to be blood-sucking parasites, but the author has never found them attached to the walls of the stomach. It is suggested that the worms may eliminate some poison, or by their injurious action on the mucous membrane of the stomach allow the passage of bacteria into the circulation and thus produce the symptoms.

Feces were gathered January 28, 1908, in an inclosure which had been free from stock since November 13, 1907. As there had been several heavy frosts and no snowstorm during this period, the worms had been exposed to severe

conditions before reaching the laboratory. The material was placed in a Petri dish, together with a small quantity of moist cotton, water being occasionally added. Examinations made at different times revealed a number of active larvæ until August 18, at which time but one or two were alive, and these could not have lived much longer. It is considered probable, however, that the larvæ would have lived much longer under natural conditions. A calf is said to have become infested when placed in a field that had been free from animals from November 26, 1906, to September 23, 1907.

Medicinal treatment proved very unsatisfactory and is considered of little value. This was not due to the fact that the worms could not be destroyed but rather to the difficulty in getting drugs directly to the fourth stomach. The author drenched animals with colored solutions, but was unable to find more than traces of the coloring matter in the fourth stomach.

The details of the experiments in which coal-tar creosote, carbon bisulphid, and other anthelmintics were used are presented in tabular form.

During 1904–5 the administration of 1 per cent of coal-tar creosote appeared satisfactory, but subsequent trials have led the author to believe that the improvement noted at that time must have been due to other causes, as all these materials were evidently useless. Most of the animals died and the post-mortem examinations showed that the parasites were not affected by the treatment.

In view of these experiments it appears that the checking of the disease must be accomplished by preventive measures, and such measures, including the burning, abandoning, and cultivation of pastures are briefly considered. Pastures which can not be cultivated can be freed by burning and abandoning for 18 months if washing of material from infested land is prevented.

The fight against sheep pox in the high plateaus of Algeria and the Sahara. A. Boquet (*Hyg. Viande et Lait, 2 (1908), No. 7, pp. 297–317*).—This is an account of sheep pox which is said to be enzootic throughout Algeria, particularly in the high central plateau and on the Saharan border. It occurs in acute and subacute form, the acute form usually resulting in a mortality of from 6 to 8 per cent, but in some cases in a mortality of 40 per cent. The subacute form is benign.

Is the Bacillus suipestifer the cause of hog cholera or not? Hübener (*Centbl. Bakt. [etc.], 1. Abt., Orig., 47 (1908), No. 5, pp. 586–590*).—The author concludes that hog cholera is caused by an organism that is more resistant to antiseptics than is *B. suipestifer*.

Prevention of hog cholera, M. Jacob (*Tennessee Sta. Bul. 85, pp. 27–31; Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907–8, pp. 84–88*).—In an introductory note the director of the station states that the results of tests of inoculation with serum have proved sufficiently satisfactory to warrant the station in giving this matter an important place in the cooperation and extension work in Middle Tennessee.

A brief account is given of the methods in use. The hog-cholera work was started at the station farm August 22, 1908. In order to test the efficiency of the serum produced, 2 pigs were each inoculated with 2 cc. virulent blood and one of the two simultaneously with 30 cc. of the serum. The check pig died, while the one simultaneously treated with serum suffered no ill effects whatever. In the middle of November a herd near Nashville in which hog cholera had broken out was immunized by the serum-simultaneous method. Whereas 64 animals had died during the 6 weeks previous to the treatment, up to December 31 but 16 additional hogs had died. No deaths had occurred during the last 2 weeks of December, indicating that those that did die after being immunized had probably been infected at the time the inoculation was made.

Shifting lameness, G. R. WHITE (*Amer. Vet. Rev., 34 (1909), No. 4, pp. 482–492*).—A paper read before the annual meeting of the American Veterinary Medical Association, held at Philadelphia, Pa., in September, 1908. The author considers the pathology of the lameness-producing lesions and the differential diagnosis of osteoporosis, millet disease, and rheumatism, the three systemic diseases in which shifting lameness is a prominent and well-marked symptom. A bibliography is given.

Shipping fever, C. H. JEWELL (*Amer. Vet. Rev., 34 (1909), No. 4, pp. 512–518*).—A paper presented at the annual meeting of the American Veterinary Medical Association, held at Philadelphia, Pa. The diseases here considered are influenza, strangles, catarrhal fever, and pharyngitis. Influenza antitoxin, diphtheria antitoxin, and antistreptococcic serum are reported as having been injected into army horses, the influenza antitoxin giving the best results. The author considers that advantages are derived from immunizing young horses against these fevers.

Infectious anemia or swamp fever, G. H. ACRES (*Amer. Vet. Rev., 34 (1909), No. 4, pp. 525–527*).—The author has found this disease prevalent in North and South Alberta, the Yukon Territory, and northern Ontario, treating several cases within the past few months. The best results were obtained from the following treatment: Two-dr. doses of liquor cresol in a pint of water given 4 or 5 times daily; potassium chlorate, ½ oz., antifebrin, 2 dr., and iron sulphate, 1 dr. given 3 times daily in a bran mash; and when the animals are very weak grain doses of strychnin given 3 times daily. Antistreptococcic serum is reported to have been used in several cases.

Inoculation of dogs with the parasite of Kala-azar (Herpetomonas [Leishmania] donovani) with some remarks on the genus Herpetomonas, W. S. PATTON (*Parasitology, 1 (1908), No. 4, pp. 311–313*).—Experiments conducted by the author appear to show that the dog is not susceptible to *H. donovani*, and he supports the view that the Indian and Assam species is distinct from the Tunisian reported by Nicolle (E. S. R., 20, p. 883). The few dogs examined in Madras have never harbored the parasite.

Mange in coyotes, M. E. KNOWLES (*Breeder's Gaz., 55 (1909), No. 3, p. 130*).—A brief account is given of the occurrence of sarcoptic mange in wolves and coyotes in Montana and Wyoming. This is considered by the Montana State veterinarian to be due to original inoculations made by his department.

Mycosis of domestic fowls, G. NEUMANN (*Rev. Vét. [Toulouse], 33 (1908), No. 7, pp. 417–424, fig. 1*).—A brief review of the literature and a consideration of Aspergillosis of domestic fowls. While many species of Aspergillus have been reported as occurring in the respiratory system of fowls, for the domestic fowls at least it appears to be established that all cases of the disease are due to the *Aspergillus fumigatus* of Fresenius.

Syngamosis of domestic fowls, G. NEUMANN (*Rev. Vét. [Toulouse], 33 (1908), No. 9, pp. 549–560*).—The author briefly discusses tracheal bronchitis in fowls and reviews the literature upon the subject. Two species are known to affect domestic fowls, *Syngamus trachealis* the gallinaceous, and *S. bronchialis* the palmiped. fowls.

Interim report on the parasites of grouse, A. E. SHIPLEY (*Cambridge, 1908, pp. 12*).—Among the ectoparasites of the grouse here recorded are 2 species of bird lice (*Goniodes tetraonis* and *Nirmus cameratus*), the louse fly (*Ornithomyia lagopodis*), 2 species of flea (*Ceratophyllus gallinulæ* and *C. garei*), the European castor-bean tick (*Ixodes ricinus*), and the mite (*Aleurobius farinæ*). It is stated that *I. ricinus* has only been found on grouse in the nymphal and larval stages.

The endoparasites reported include 3 species of cestodes (*Davainea urogalli*, *D. cesticillus*, and *Hymenolepis microps*), 5 species of nematodes, and 2 species of protozoa. *D. urogalli* is the commonest and by far the largest tapeworm found by the author in grouse. *Trichostrongylus pergracilis*, the species of roundworm most commonly met with in grouse, lives in the paired ceca, and is the cause of serious lesions. The fly *Scatophaga stercoraria*, while not a parasite of the grouse, lays its eggs in grouse droppings and its maggots live on and in these dejecta.

A cause of appendicitis and other intestinal lesions in man and other vertebrates, A. E. Shipley (*Parasitology, 1 (1908), No. 4, pp. 263–279*).—The author's observations on a large number of recently dead or dying grouse lead him to conclude that in many cases death is primarily caused by the presence of parasitic worms, either cestodes or nematodes, in various parts of the alimentary canal. Attention is called to striking cases of lesions caused by thread worms, such as *Sclerostoma equinum*, often found in the colon and cecum of the horse. The author considers in turn the effects upon the intestinal walls of three of the commonest human nematodes, *Oxyuris vermicularis*, *Ascaris lumbricoides*, and *Trichocephalus trichiurus*.

The life cycle of Filaria grassii, G. Noé (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 17 (1908), I, No. 5, pp. 282–293, figs. 4; abs. in Bul. Inst. Pasteur, 6 (1908), No. 15, p. 689*).—This large Filaria of the dog has been found by the author to be transmitted by *Rhipicephalus sanguineus*. The filarial larvæ are ingested by the tick in the nymphal stage and complete their development in the adult tick, from which they are later inoculated into the vertebrate host. The fact that the male ticks also serve as intermediate hosts is important as regards the dissemination of the Filaria. An account is given of the development of the Filaria that takes place within the tick.

Filaria volvulus, its distribution, structure, and pathological effects, A. C. Parsons (*Parasitology, 1 (1908), No. 4, pp. 359–368, fig. 1*).—The author has observed several cases of this infection in northern Nigeria, and concludes that time will probably show that *F. volvulus* is more common than has hitherto been suppposed. "Analogy would lead us to suspect that *F. volvulus* is transmitted by some blood-sucking insect. The geographical distribution of *F. volvulus*, as at present known, seems to correspond more or less with regions in tropical Africa that are associated with such insects as have been proved to act as carrying agents in other parasitical affections."

Some notes on the hemogregarines parasitic in snakes, C. C. Dobell (*Parasitology, 1 (1908), No. 4, pp. 288–295, pl. 1*).—A list of the snakes infected with hemogregarines is appended to this account.

A trypanosome and hemogregarine of a tropical American snake, C. M. Wenyon (*Parasitology, 1 (1908), No. 4, pp. 314–317, pl. 1*).—The author describes a new trypanosome taken from a snake of tropical America as *Trypanosoma erythrolampri*. While hemogregarines are very common in snakes the reverse is said to be the case with trypanosomes. Several observers have recorded the presence of trypanosomes in snakes, but hitherto no one has given an accurate description of one of these in either the living or stained condition.

The treatment of trypanosomiasis in horses by orpiment alone or in connection with atoxyl, A. Thiroux and L. Teffaz (*Compt. Rend. Acad. Sci. [Paris], 147 (1908), No. 15, pp. 651, 652*).—The diseases caused by *Trypanosoma cazalboui* (souma) and by *T. dimorphon* have been successfully treated by the combination of orpiment and atoxyl. In experiments conducted all of 3 horses treated were cured. It is possible that Mbori is also curable by this treatment. Two horses suffering with souma have been treated with success by orpiment alone.

The use of tartar emetic in the treatment of trypanosomiasis, A. LAVERAN (*Compt. Rend. Acad. Sci. [Paris], 147 (1908), No. 12, pp. 510–514*).—Guinea pigs infected with *Trypanosoma cruzi*, *T. gambiense* and the trypanosome of Togo were treated with hypodermic injections of a 2 per cent solution of sodium antimonyl tartrate. The results were generally favorable, particularly when the antimonyl salt was used with atoxyl.

The Schizogregarines, H. B. FANTHAM (*Parasitology, 1 (1908), No. 4, pp. 369–412, figs. 9, dgm. 1*).—A review and a new classification.

RURAL ENGINEERING.

Irrigation in Peru, E. GUARINI (*Mem. Dir. Fomento [Peru], 1907–8, vol. 2, pp. 100–128, pl. 1*).—In this report of the director of public works there is given a general résumé of the status of irrigation in Peru, including descriptions of works under construction and proposed projects, and data relative to irrigation pumping by gas engines and electricity.

Earth slopes, retaining walls and dams, C. PRELINI (*New York, 1908, pp. IX+129, figs. 75*).—As stated in the preface of this work, a large part of it consists of graphical methods of solving problems concerning the slopes of earth embankments, the lateral pressure of earth against a wall, and the thickness of retaining walls and dams. The subjects of the chapters are The Stability of Earth Slopes; Retaining Walls: Graphical and Analytical Methods; and The Design of Retaining Walls. Dams are treated as a particular case of retaining walls in which the material to be sustained is deprived of friction.

The method of treatment is in the main based on the well-known theories, but greater prominence is given to graphical than to analytical methods. The graphical determination of earth slopes of uniform stability is presented in an original way by the author.

Progress reports of experiments in dust prevention, road preservation, and road construction (*U. S. Dept. Agr., Office Pub. Roads Circ. 90, pp. 23*).—This circular contains descriptions of experiments conducted in 1908 by the Office of Public Roads, together with further results of experiments previously noted (E. S. R., 19, p. 1189). The 1908 experiments deal principally with the treatment of roads during construction, while earlier work has been chiefly concerned with surface treatment of old roads.

Eleven experiments were made at Newton, Mass. Ten of these were on different sections of an old macadam road, using asphaltic preparations alone and with different flush coats of residual oil, water-gas tar, and water-gas tar and coal-tarred sand. A mixture of oil, molasses, and lime was used in resurfacing another road, this constituting the eleventh experiment. The total cost of applying new material to these roads to a depth of 4 in. was, per square yard, 46.92 to 64.04 cts. with the asphaltic preparations, 47.28 cts. with the oil, 46.55 to 53.40 cts. with the tar treatment, and 62.34 cts. with the oil, lime, and molasses. The difference between these costs and 40 cts. per square yard, which is the average cost of macadam in that locality, is considered to represent the additional cost of using the binders. These costs are deemed to be greater than if the work had been on long stretches, where more system in construction could be employed. With respect to the condition of these roads after 3 months' wear, all are stated to be in good condition.

At Independence, Kans., a street composed partly of slate-colored gumbo and the remainder of buckshot clay, and another composed of disintegrated shale and argillaceous sandstone were treated with an artificial asphalt preparation of specific gravity 0.981. The construction of these streets, exclusive of grading, cost 28.25 cts. per square yard.

An experiment begun at Birmingham, Ala., consisted of building a 24-ft. tar macadam road, with 5-ft shoulders, out of an old road. Tar, tar slag, and tar slag limestone were used, the tar being a coke oven by-product of specific gravity 1.169. The average total cost per square yard was $1.10.

Three experiments were begun in Kansas to determine if sand clay could be used as a wearing surface capable of resisting the action of the constant winds, and in one experiment clay was used to form a hard top surface on a bridge approach. The cost per square yard of this clay treatment was from 10 to 14 cts.

Of the earlier experiments reported upon, the sections of road at Wayland, Mass., were inspected about 13 months after treatment. The special tar preparation employed on 2 of these sections proved to have given greatest satisfaction, and the other tar experiments showed varying results. It is reported that these experiments seem to indicate that a properly refined coal tar is much preferable to a crude tar.

At Bowling Green, Ky., where rock asphalt was used as a binder and also to fill the voids of a fresh macadam surface, the road was found to be smooth and free from ruts. Crude oil had been satisfactory as a dust layer.

At Jackson, Tenn., the tar treatment was found to be on the whole satisfactory, confirming results previously reported. Oil, where used on a country road, proved beneficial in preventing raveling and washing and in laying dust.

Illinois experimental macadam roads (*Good Roads Mag., n. ser., 10 (1909), No. 5, pp. 158–161, figs. 6*). This is an abridgment of a report as to the condition of several experimental macadam roads constructed in Illinois under the direction of the State Highway Engineer.

Among the findings it is reported that the sticky and gumbo soils apparently furnish the most solid foundation, while the most treacherous conditions exist on hilly roads where seepy places occur and where there is often encountered more open or porous soil.

The chief deterioration of the roads was found to be caused by mud tracked upon them, and the report includes suggestions as to methods of protecting the ends of roads to prevent this.

Tables of construction cost of some of the roads are given, with brief descriptions. In this connection it is stated that there is a prevailing impression that the average cost per mile is not over $2,000 or $3,000, but that it is impossible to construct good roads at such figures.

Agricultural machinery and implements. E. Wrobel (*Landwirtschaftliche Maschinen und Geräte. Hannover, 1907, pp. 218, figs. 170*).—The object of this book is stated to be to explain the construction and use of machinery with reference to the peculiar purpose of each machine and its parts. An introductory chapter deals with soils and soil cultivation, and the essential mechanical and physical processes of plant growth. There is a brief review of the present status of the agricultural machine industry in Germany, followed by a detailed description of plows, cultivators, harrows, manure handlers and spreaders, drills, weeders, and other implements for the care of plants.

Agricultural machines. K. Walther (*Die Landwirtschaftlichen Maschinen. Leipsic, 1908, pp. 132, figs. 91*).—This is the first of a series of books on the subject of agricultural machinery, and treats of machinery for cultivating soils and plants. The construction and mode of operation of various types of plows, cultivators, harrows, fertilizer distributers, drills, and machines for the care of plants are explained in detail. There is also included a chapter on the construction and management of machinery used for mechanical cultivation.

[Traction plowing] (*Canad. Thresherman and Farmer, 12 (1909), No. 4*).—This number is especially devoted to traction plowing, and contains a brief ac-

count of its evolution in this country and in England, and several short articles giving the experience of users of traction plows. In these are given data as to cost of operating and the capacity of engines and plows under various soil conditions and in different localities.

Trials with commercial fertilizer spreaders at Dalum Agricultural School, 1908. M. DALL (*Tidsskr. Landökonomi, 1909, No. 3, pp. 129–142*).—An illustrated account of trials of four types of spreaders, with descriptions of the machines, tabulated results of the trials, and a statement of the awards of prizes.

Industrial alcohol in relation to the farmer, R. H. TRUE (*Ann. Rpt. Wis. Bd. Agr., 1908, pp. 402–417; Bien. Rpt. Kans. Bd. Agr., 16 (1907–8), pp. 687–696*).—The author gives a brief account of the requirements of the revenue laws, the composition and denaturing of alcohol, the raw materials available for its manufacture, its uses for lighting, heating, and power, and a discussion of economical production.

As regards economical production he states that, although there has been a very great increase in the manufacture of denatured alcohol since the enactment of the law relating to it, it seems improbable that the farmer will become an effective factor in the total distillation of the country, because of the large investment and plant which is required by maximum economy of operation. The influence of the law may, however, be felt by the farmer in increasing the market for his corn and other fermentable products.

Deriving ethyl alcohol from sawdust, G. U. BORDE (*Manfrs. Rec., 55 (1909), No. 15, pp. 45, 46*).—The author gives here an account of experiments which he conducted in France with a still constructed especially for manufacturing ethyl alcohol from sawdust. The process is briefly described, with data relative to the cost and economy of operation. It is estimated from the results obtained that the net return from 1,000 ft. B. M. of lumber would be $33.51 if this method is employed.

The peat fuel industry of Canada (*Engin. and Min. Jour., 87 (1909), No. 18, p. 905*).—This is an abstract of a memorandum presented by the Dominion superintendent of mines to the Canadian House of Commons. The question of utilizing peat bogs and lignite deposits is attracting attention because of present economic conditions. From reports received there is estimated to be in the Dominion about 37,000 sq. miles of peat bogs from 5 to 10 ft. deep, but this is thought to be but a small fraction of the total.

It is believed that the successful working of bogs and the manufacture of raw peat into marketable fuel is possible, and an experimental plant for determining the value of peat and lignite is recommended.

The peat resources of the United States. C. A. DAVIS (*Engin. Mag., 37 (1909), No. 1, pp. 80–89*).—This article discusses more particularly the utilization of peat for fuel, including gas, charcoal, and coke production, for paper making, fiber production, fertilizer filler, and alcohol. The total amount of available peat in the United States is estimated at 12,888,500,000 tons.

Reports upon the Irish peat industries, II, H. RYAN (*Econ. Proc. Roy. Dublin Soc., 1 (1908), No. 13, pp. 465–546, pls. 2, figs. 18*).—Reports on the peat fuel and distillation industries are given, with a systematic bibliography of references to literature relating to peat and peat industries.

The sanitation, water supply, and sewage disposal of country houses, W. P. GERHARD (*New York, 1909, pp. XX+328, figs. 113, map. 1*).—As stated in the preface, "the first part of the book treats of the general sanitation of country houses, brings a comparison of life in the city and in the country from a health point of view, dwells on the advantages of country life, and gives a condensed summary of the essential requirements of healthfulness in

country houses. The soil, the subsoil, surface drainage, aspect, healthful surroundings and those which are objectionable, the cellar of the house, the lighting, heating and ventilation, the water supply, sewerage and plumbing, are briefly discussed.

"In the second part detailed advice is given as to how to procure a satisfactory water supply. The sources of water, the various modes of raising it, the storage in reservoirs, elevated tanks or underground pressure tanks, and finally water distribution, are dwelt on at length and illustrated by actual examples from the author's engineering practice."

"All improvements" in country houses (*Dun's Rev., 13 (1909), No. 3, pp. 49–51, figs. 6*).—The installation of sanitary and heating appliances in country homes is discussed. Attention is particularly directed to equipment of this sort which it is claimed may be purchased ready fitted and installed by the purchaser.

Home conveniences at small expense, LULU S. WOLFORD (*Ann. Rpt. Nebr. Bd. Agr., 1908, pp. 219–228, figs. 3*).—The construction of kitchens, water supply, and other topics are discussed with special reference to lessening the work of the farmer's wife.

RURAL ECONOMICS.

The cost of producing Minnesota farm products, 1902–1907, E. C. PARKER and T. P. COOPER (*U. S. Dept. Agr., Bur. Statis. Bul. 73, pp. 69, pls. 2, fig. 1*).—In continuation of previous work this bulletin gives the results of investigations, including the statistics and conclusions reached for the years 1902–1904, inclusive (E. S. R., 18, p. 686), on the cost of producing farm crops in typical sections of Minnesota with particular reference to the years 1905, 1906, and 1907. The factors of cost include a determination of the wages of farm labor including cost of board, maintenance of farm horses and cost of horse labor, depreciation of farm machinery, land rental, and general expenses. The cost of production of staple crops grown was as follows:

Average annual cost per acre of producing field crops, 1902–1907.

Crop.	Average for all farms.	Crop.	Average for all farms.
Barley—fall plowed	$8.211	Hay—timothy and clover (two cuttings)	
Clover—cut for seed	6.500	Hay—millet	$7.178
Corn—ears husked from standing stalks	10.438	Hay—wild grasses	7.105
Corn—cut, shocked, and shredded	15.297	Hay—timothy	4.042
Corn—cut, shocked, and hauled in from the field		Hemp	3.394
Corn—grown thickly and siloed	10.265	Mangels	6.741
Flaxseed—thrashed from windrow	19.892	Oats—fall plowed	32.682
Flaxseed—stacked from windrow	7.496	Oats—on disked corn stubble	8.863
Flaxseed—bound, shocked, stacked, and thrashed	7.851	Potatoes—machine production	8.884
Fodder corn—cut and shocked in field	7.278	Potatoes—machine production (use of fertilizer)	26.366
Fodder corn—cut, shocked, and stacked	9.650	Timothy—cut for seed	37.721
Hay—timothy and clover (first crop)	12.369	Wheat—fall plowed	4.832
	5.391		7.249

Some other cost data include the average cost of maintaining milch cows estimated at $40.97 per year exclusive of the cost of shelter, which ranges from $4 to $8.

The average annual labor cost of feeding and managing 3 sows and 19 pigs amounted to $30.37; of feeding and managing a flock of 48 native sheep, $20.34; the cost of production of pasture per acre is about $4.07; the average cost of feeding a farm work horse a year was $51.39.

An agricultural monograph of Great Britain, E. DOMMEN (*Monographie Agricole de la Grande-Bretagne. Paris, 1908, pp. 66*).—This volume briefly discusses physiographic features, land ownership, agricultural production, farm equipment and management, live-stock raising, the dairy industry and technology, methods of selling agricultural products, agricultural instruction, the ministry of agriculture, and agricultural credit.

[The condition of peasant proprietors in France], J. RUAU (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 3, pp. 316–346; Bul. Soc. Nat. Agr. France, 69 (1909), No. 3, pp. 275–340*).—This is an address by the minister of agriculture, delivered March 14, 1909, before the National Federation of Mutual Associations.

The author deals with the present state of agriculture in France, with particular reference to the number of small holdings and the economic and social condition of peasant proprietors. Statistics of small, medium, and large-size holdings are presented and discussed. The number of small holdings is shown vastly to exceed all others, and the cause of this is traced to the inherent desire of French peasants to own the land they exploit. From this study, which is characterized as the most complete yet made, the conclusion is reached that the condition of peasant proprietors is prosperous and flourishing and not in a deplorable condition as claimed by labor agitators.

A bibliography of the agrarian problem in France is included.

General expenses in agriculture and their influence on profits, BRANDIN (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 3, pp. 172–185; Bul. Soc. Agr. France, n. scr., 41 (1909), May 1, Sup., pp. 343–351*).—The author discusses the various items of general expense which differ on farms in France according to physical contour, condition of land, location as to markets, number of laborers and facilities for their accommodation, control of insects and fungus diseases and animal pests, premiums of insurance, and many other items which seldom enter into the farmer's bookkeeping, but which annually amount to large sums and greatly reduce the profits of the industry.

Investigations on the profitableness of agriculture in Switzerland during 1907, E. LAUR (*Ann. Agr. Suisse, 10 (1909), No. 2, pp. 9–120; Landw. Jahrb. Schweiz, 23 (1909), No. 2, pp. 66–163*).—In addition to data on the yields, value, exports, etc., of farm products raised in 1907, this report contains a detailed account of the profitableness of the industry as determined from 250 small, medium, and large holdings.

The condition of agriculture in Portugal (*Bol. R. Assoc. Cent. Agr. Portuguesa, 11 (1909), No. 4, pp. 154–196*).—This is a series of propositions prepared by a committee and discussed at the meeting of the Royal Association of Agriculture held on March 29, 1909. The economic, scientific, and educational deficiencies of the agricultural system in Portugal are presented and remedies to improve present conditions are suggested. Among the latter are mentioned general and special education, scientific investigations and research, the gathering and publication of statistics regarding rural conditions, agricultural credit and other associations, road improvement, etc.

[The movement of agricultural wages in Bavaria] (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 17, pp. 277–282*).—Data on the day and yearly wages of farm hands in Bavaria for the years 1896, 1906, and 1908, as measured in money and actual values, are tabulated and discussed. A general increase in wages for all classes of rural workers is indicated.

The breaking of contracts by agricultural laborers in Pomerania, VON STOJENTIN (*Ztschr. Agrarpolitik, 7 (1909), No. 4, pp. 180–194*).—The number of foreign and native farm laborers employed in the province is presented and

discussed with reference to contract breaking, which the statistics for several years show to be on the increase, especially among foreign laborers.

Agricultural credit, H. L. RUDLOFF (*Wiener Landw. Ztg., 59 (1909), No. 27, pp. 277, 278*).—The methods of securing credit from agricultural banks by tenants and landowners in Germany, Austria-Hungary, Italy, France, Belgium, and Denmark, and the legal limitations set by the various governments as to the extent of indebtedness and the kinds of property that can be pledged as security are discussed in this article.

The agricultural bank of the Philippine Government, F. A. BRANAGAN (*Philippine Agr. Rev. [English Ed.], 2 (1909), No. 2, pp. 98–104*).—The author briefly describes the organization and operation of agricultural banks in South Australia, Queensland, New Zealand, Egypt, and Oklahoma, with a more detailed account of the Philippine agricultural bank organized under the law of June 18, 1908. The object of the bank is to enable farmers to borrow money at a reasonable rate of interest (10 per cent), repayable at any time within 10 years. The kinds of securities required and the purposes for which loans can be made are described.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 4, pp. 33–40*).—Statistical data on the condition and acreage of principal crops in the United States and foreign countries, and the value and prices of agricultural products are reported.

AGRICULTURAL EDUCATION.

Agricultural instruction and its methods, P. DE VUYST (*L'Enseignement Agricole et ses Methodes. Brussels, 1909, pp. XII+354*).—The information brought together in this manual is intended for teachers of agriculture and students of education. It includes a systematic statement of the different agencies for agricultural education in the principal countries of Europe and North America, and a discussion of methods of teaching and other means of disseminating agricultural information.

Part 1 of the book is devoted to agricultural instruction in general schools, elementary, secondary, and collegiate; part 2, to instruction in technical agricultural schools of different grades, and part 3, to the various agencies for disseminating agricultural information, such as departments of agriculture, experiment stations, conventions, institutes, reading circles, expositions, and agricultural museums.

In considering each of the different classes of schools the author discusses the importance of agricultural education, the character of instruction in the class room and out of it, the preparation of teachers, methods of teaching, apparatus and illustrative material, and text-books and works of reference. There are numerous references to the literature of agricultural education, and one chapter is devoted entirely to bibliographies.

Vocational possibilities in country schools, E. M. RAPP (*Harrisburg, 1909, pp. 14*).—In this address, delivered before the city, borough, and county superintendents of Pennsylvania, the author speaks from practical experience as to the educational value of elementary agriculture in the rural schools.

In developing the doctrine that education should prepare the child for his probable vocation he advocates "for city children manual training as a major and agriculture as a minor; for country children agriculture as a major and manual training as a minor." "Instead of putting agriculture into the country school, let us put the school into agriculture; into right relation with its environment." "The education that should be given to boys who are to be farmers will make the best kind of foundations upon which to rear the struc-

ture of any calling or profession." "We have talked long in our schools of the dignity of work; it is high time we were acquainting our children with the real means of becoming dignified by such a performance. It is only in the schools that learning is divorced from doing."

These selected quotations indicate the trend of this noteworthy address.

Agricultural instruction in the army, F. MAIER-BODE (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 15, pp. 243–251*).—A report on the development of agricultural instruction in the army in Bavaria and other German States, and in Italy, Austria-Hungary, Russia, Denmark, Sweden, France, and Belgium.

Popular horticultural instruction, MARCHANDISE (*Tribune Hort. [Brussels], 4 (1909), No. 149, p. 275*).—A brief note setting forth the object and organization of popular horticultural instruction in Belgium.

School gardening and agricultural education in England, F. BONSER (*School News and Pract. Ed., 22 (1909), No. 9, pp. 412–414, figs. 4*).—Extracts from the regulations affecting school gardening and agricultural education for Cheshire County and from the general code of 1908 are given. The author states that "in general the school gardening of England is much more a vocational training than in America," and refers briefly to the training courses for teachers in science and nature-study work at the Technical Laboratories in Chelmsford, Essex County, and to the instruction offered in the dairy schools at Chelmsford and at Griff House.

Itinerant agricultural domestic science schools, P. SCHINDLER (*Indus. Lait. [Paris], 34 (1909), Nos. 8, pp. 122–125; 9, pp. 136–139; 10, pp. 152–156; 12, pp. 190–196; 13, p. 214–218; 15, pp. 280–284; 16, pp. 307–312*).—A discussion of the courses, methods, and organization of itinerant agricultural domestic science schools.

Women's institutes of Ontario, G. A. PUTNAM (*Rpt. Women's Insts. Ontario, 1909, pt. 2, pp. 21*).—A list of meetings and speakers at women's institutes in the Province of Ontario is given, together with the programmes presented.

Woman and the home, A. PIFFAULT (*La Femme de Foyer. Paris, 1909, pp. XII+391*).—Part 1 of this book considers the rôle of woman in modern society, the evolution of domestic occupations, the scope and definition of domestic science education, the home and its furnishings, food and clothing, domestic finances, hygiene and elementary medicine, etc. In part 2 the following subjects are discussed: Who should give domestic science instruction—the mother or the school; physical and natural sciences and moral education considered as bases of domestic science education; examination of objections which may be made to the study of elementary medicine and of childhood; and domestic science methods and courses of instruction.

Practical nature study and elementary agriculture, J. M. and J. G. COULTER and ALICE J. PATTERSON (*New York, 1909, pp. IX+354*).—Part 1 of this work discusses the general relations of nature study to elementary agriculture and the training of teachers who are already at work in the schools giving instruction in these subjects. Part 2 contains a detailed topical outline by grades and seasons of the nature-study work of the Illinois State Normal University. In part 3 this is abbreviated into a shorter outline for the lower grades, with suggestions for correlation with other school subjects, followed by a detailed course in elementary agriculture for the seventh and eighth grades. Part 4 aims to provide inexperienced teachers with sufficient general information in natural science to guard against the most common misconceptions. One of the most important chapters in the book deals with The Dangers of Nature Study, such as the confusion of mere terminology with knowledge, the drawing of unwarranted inferences, and the trend toward a "mawkish sentimentality" in teaching the subject.

Home nature-study course, ANNA B. COMSTOCK (*Home Nature-Study Course [Cornell Univ., State Col. Agr.], n. scr., 5 (1909), No. 4, pp. 91–120, figs. 16*).—Suggestions are presented for the work of fourth and fifth year pupils as outlined in the Syllabus of Nature Study and Agriculture issued by the New York State Department of Education. Lessons are given on violets, swallows, the purple martin, chimney swift, skunk, summer stars, walnuts, and an observation beehive.

Elementary agricultural chemistry, H. INGLE (*London, 1908, pp. IX+250; rev. in Nature [London], 80 (1909), No. 2056, pp. 93, 94*).—This book is an attempt to present the fundamental facts and principles of agricultural chemistry to readers and students not familiar with general chemistry. The author admits that any such attempt "must be in many ways a failure," and strongly recommends the previous reading of some good modern text-book on the more general subject. Few references are given to chemical literature, but the book abounds in chemical formulæ and otherwise presents much of the technical appearance of a school text-book. It is especially full in its treatment of the ash constituents of the food of animals and the composition of cow's milk.

Preventing damage by frost, J. W. SMITH (*Agr. Col. Ext. Bul. [Ohio State Univ.], 4 (1909), No. 9, pp. 9–12, figs. 2*).—Conditions favorable for frost formation and methods of protection against frost are set forth by the author.

Some things to learn about bees, H. OSBORN (*Agr. Col. Ext. Bul. [Ohio State Univ.], 4 (1909), No. 9, pp. 4–8, figs. 7*).—Suggestions as to what can be learned concerning the habits of bees from an observation hive set up near the school.

MISCELLANEOUS.

Annual Reports of the Department of Agriculture, 1908 (*U. S. Dept. Agr. Rpts. 1908, pp. 862*).—This consists of the reports of the Secretary and heads of Bureaus. The various reports are also issued as separates.

Report of the Secretary of Agriculture, 1908, JAMES WILSON (*U. S. Dept. Agr. Rpt. 87, pp. 100*).—This report, which is reprinted in abridged form from the publication noted above, contains a review of the work of this Department for the fiscal year ended June 30, 1908, together with a review of the progress of agriculture in this country during the past 12 years, as previously noted editorially (E. S. R., 20, p. 501).

Thirty-first Annual Report of North Carolina Station, 1908 (*North Carolina Sta. Rpt. 1908, pp. 188*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1908, reports of the director and heads of departments, numerous special articles abstracted elsewhere in this issue, and reprints of a press bulletin on The Grape Black Rot and of Bulletins 197–199 previously noted.

Finances, meteorology, index (*Maine Sta. Bul. 163, pp. 387–396+XII*).—This contains the organization list of the station, meteorological observations noted on page 113 of this issue, a financial statement for the fiscal year ended June 30, 1908, an index to Bulletins 151–163, which, together with Official Inspections 1–6, noted on page 165 of this issue, collectively constitute the twenty-fourth annual report of the station, a list of bulletins and of miscellaneous and technical publications issued during the year, and announcements and notes on the work, personnel, and equipment of the station.

Report of cooperative and extension work in agriculture in middle Tennessee for the years 1907 and 1908 (*Tennessee Sta., Rpt. Coop. and Ext. Work Agr. Middle Tenn. 1907 8, pp. 3–102*).—This includes a general report of this work by the director of the station, followed by detailed reports abstracted elsewhere in this issue.

NOTES.

Arizona Station.—Dr. A. W. Morrill, of the Bureau of Entomology of this Department, has been appointed entomologist and will begin work September 1. He will also serve as entomologist of the newly established Territorial Horticultural Commission, consisting of Foster H. Rockwell as chairman, Director Forbes of the station as secretary-treasurer, and Andrew Kimball. A rigid crop-pest law has been enacted, modeled after that of California, and containing both inspection and quarantine features.

George F. Freeman, assistant botanist of the Kansas College and Station, has been appointed agronomist and will take up work in the breeding of alfalfa and other crops for southwestern conditions.

Colorado College and Station.—Wendell Paddock has resigned as botanist and horticulturist to become professor of horticulture at the Ohio University. W. E. Vaplon has been appointed poultryman. G. P. Weldon, field entomologist at Delta, has been transferred to Grand Junction, and R. S. Herrick has been appointed field horticulturist at Delta.

Connecticut State Station.—Prof. Samuel W. Johnson, director of the station from its organization at New Haven, in 1877, until January 1, 1900, died in New Haven, July 21, after a brief illness, aged 79 years. An account of his life will appear in a later issue.

Massachusetts College.—Dr. Joseph S. Chamberlain, chief of the Cattle-Food and Grain Laboratory of the Bureau of Chemistry of this Department, who has been studying abroad the past year, has been appointed associate professor of chemistry.

Minnesota University and Station.—The appropriations by the last legislature include $50,000 for a girls' dormitory, $15,000 for the completion and equipment of the dairy pavilion, $15,000 for remodeling and equipping the dairy hall, $6,000 for hog cholera work, $6,000 for a denatured alcohol plant, $1,000 for soil inspection, $4,000 for live stock, $3,500 for dairy extension work, $1,000 for horticultural investigations, $1,000 for entomological investigations, $3,500 for the breeding of field crops, $9,000 for forestry instruction, $1,500 for experiments in the use of preservatives for timber, $2,000 for drainage studies, $400 for plant diseases, $3,500 for the distribution of entomological charts in the public schools, $1,000 for the study of noxious weeds, and $10,000 for the establishment and maintenance of a poultry department.

The Crookston school of agriculture received $82,000 for maintenance and buildings, and the Crookston and Grand Rapids substations $11,500 and $14,000 respectively. The Grand Rapids substation is to undertake special experiments as to the best methods of stump clearing in the heavily timbered and cutover sections of northern Minnesota.

In addition to the above appropriations, a grant of $50,000 was made for extension work in agriculture during the next biennium, and a division of agricultural extension and home education in the department of agriculture was established to have charge of the work. This division is empowered to

devise comprehensive elementary courses in agriculture open to all residents of the State, through correspondence courses, local lectures, demonstrations, and the publication of home education bulletins which shall "give in plain and practical form the results of the experiments and investigations of the various divisions of the State experiment station and substations of the University of Minnesota, and such other information as may be useful in any farm home."

The officers are to consist of a chief in immediate charge of the work, associates consisting of the chiefs of the divisions of investigation and instruction in the department of agriculture, who will serve in an advisory capacity, an editor, and such other instructors, assistants, and clerks as may be needed. If it seems advisable, the board of regents are to cooperate with the board of administration of the State farmers' institutes in carrying on the educational work provided for in this act.

The *Minnesota Farm Review* states that William Boss, professor of farm mechanics, has resigned to devote himself entirely to commercial work.

Missouri University and Station.—H. J. Waters has resigned as dean and director to accept the presidency of the Kansas College, the resignation becoming effective September 1.

R. H. Emberson has been appointed professor of rural education and will act as the representative of the college of agriculture in such matters, serving as superintendent of extension work for the rural schools, in cooperation with the State superintendent, the State normal schools, and the various county superintendents. Through this agency the college will endeavor to suggest textbooks, bulletins, circulars, apparatus, and reports which will serve to acquaint each school with progress throughout the State. It is planned to have this kind of extension work explained in all the teachers' institutes with a view to having it begun the coming fall in at least six or eight schools in each county.

The first county demonstration farm to be undertaken under the act of 1907, whereby the station and the county court exercise joint supervision of such farms, has been established in Jasper County. A tract of 20 acres between Carthage and Joplin has been leased and demonstrations are in progress with crop rotations and the use of fertilizers and green manures. Temporary field trials are also under way at about 20 other places in the county in tests of the adaptability of different varieties of corn, wheat, oats, and grasses to the various soil types. An expert from the college is in charge of this work and devotes his remaining time to assisting the farmers of the locality in securing improved methods of agricultural practice. It is hoped to establish similar demonstration farms in Ray and St. Louis counties, and in the latter locality to give special prominence to fruit and vegetable growing and the problems relating to insect and fungus disease control.

Nevada Station.—An appropriation of $10,000 was made by the last legislature for the purchase of a farm in the northeastern part of the State for dry farming experiments. The farm is to be selected by a commission, and upon purchase is to be transferred to the board of regents of the station.

New Hampshire College and Station. A very successful Farmers' Week was held April 19–24, with nearly 100 in attendance.

William H. Pew, associate professor of animal husbandry and animal husbandman, has resigned to accept a similar position with the Iowa College, and will be succeeded by T. R. Arkell, a 1908 graduate of the Ontario Agricultural College. J. C. McNutt has been made assistant professor of animal husbandry and assistant animal husbandman. W. M. Barrows, assistant in zoology, has resigned to accept a similar position at the Ohio University, and C. F. Jackson, who has been assistant entomologist to the station, has been appointed assistant professor of zoology and entomology.

E. H. Thomson, a 1909 graduate of Cornell University, has been appointed special agent in the Farm Management Investigations of this Department, and will carry on farm survey work in cooperation with this station, which will be his headquarters. A farm survey will be commenced in the southern towns of the Merrimack Valley.

Oklahoma College and Station.—*Science* announces the appointment of Dr. Hardee Chambliss as professor of chemistry, vice G. L. Holter, and the resignations of O. M. Morris, horticulturist and botanist, E. E. Balcomb, professor of agriculture, Cornelius Beatty, station chemist, and L. S. Weatherby, assistant in the chemical laboratory. According to *Oklahoma Farm Journal*, Miss Orpha Caton, a 1909 graduate, has been appointed assistant professor of domestic science, G. M. MacNider, of the North Carolina State Station, station chemist, Charles Crawford, assistant in chemistry, and T. M. Jeffords, at present State superintendent and conductor of farmers' institutes, professor of agriculture for schools.

A short course in cotton grading was held from July 12 to August 7, the first two weeks being especially for farmers, and the remainder for ginners and dealers.

Utah College and Station.—By a recent act of the legislature the number of trustees has been increased from seven to nine, and John Dern and John C. Sharp, both of Salt Lake City, have been added to the board. At the annual meeting of the board the instruction work was formally organized into separate schools. Director Ball, of the station, Miss Ellen A. Huntington, professor of domestic science, and Dr. George Thomas, professor of economics, have been designated directors, respectively, of the schools of agriculture, domestic science, and commerce; Joseph W. Jenson, professor of irrigation engineering, has been made acting director of the school of mechanic arts; and L. A. Merrill, director of extension work.

R. S. Northrop, horticulturist, and H. W. Crockett, assistant horticulturist, have resigned to engage in commercial work. J. R. Horton, assistant in entomology, has resigned to accept a position with the Bureau of Entomology of this Department, and has been succeeded by E. R. Hoff, a 1909 graduate of the college. E. H. Walters and P. V. Cardon, also 1909 graduates of the college, have been appointed assistant chemist and assistant agronomist, respectively. R. A. Hart, of the Dainage Investigations of this Office, has been transferred to the station to take charge of the cooperative drainage investigations.

Under an act of the recent legislature the college is "required to hold meetings, institutes, one or two week schools, exhibitions and demonstrations for the instruction of the citizens of Utah in the various branches of agriculture and domestic science. At least one meeting, institute, or school shall be held in each county each year," and an annual report of the work shall be published. The sum of $5,000 annually is appropriated for the purpose.

Vermont University and Station.—*Science* notes the appointment of Benjamin F. Lutman, assistant in botany in the University of Wisconsin, as assistant botanist.

Wyoming Station.—An appropriation of $7,500 was made by the legislature for experimental work in dry farming.

Denver Meeting of National Education Association.—The forty-seventh annual convention of the National Education Association was held at Denver, July 3 to 9. A most significant feature was the prominence given to topics dealing with the rural schools and to industrial education in the public schools.

Prior to the formal opening of the convention, the National Council of Education considered at length three papers related to these topics, viz, What Industrial Education Means to the Elementary Schools, by A. S. Downing, first

assistant commissioner of education in New York; Rural School Supervision, by N. C. Schaeffer, State superintendent of public instruction in Pennsylvania; and The Adjustment of Our School System to the Changed Conditions of the Twentieth Century, by E. G. Cooley, late superintendent of schools in Chicago. Each of these papers dealt in part with agricultural education and was followed by from five to ten three-minute papers and by informal discussions.

At the formal opening of the convention on Monday evening, the annual presidential address by L. D. Harvey dealt with The Need, Scope, and Character of Industrial Education in the Public School System. The principal address at the general session on Wednesday afternoon was on Education for the Improvement of Rural Conditions, by J. W. Robertson, president of Macdonald College.

Agricultural education came in for a large share of attention not only in the papers mentioned above and in the programme of the department of rural and agricultural education, but also in other departments of the association. Two papers read before the department of secondary education dealt almost entirely with agricultural education. These were Educational Unity and Its Preservation while Meeting the Demands for Industrial Training, by Eugene Davenport, of Illinois, and The Ethical Value of the Vocational in Secondary Education, by F. H. Hall, of Illinois. In the department of normal schools H. H. Seerley, chairman of the special committee on agricultural and industrial education, discussed the Davis bill in its relation to normal schools, and in the department of manual training President W. J. Kerr, of the Oregon College, discussed the question of trades school courses as related to agricultural interests. In the department of science instruction, a paper on the progress in conservation, by H. A. Winkenwerder, professor of forestry in Colorado College, was devoted largely to an appeal for instruction in forestry in the public schools.

The sessions of the department of rural and agricultural education were well attended and the discussions on the different papers indicated a lively interest in all matters pertaining to instruction in agriculture in public schools. The programme of the first session included an address on Agricultural Education for Rural Districts, by S. A. Knapp of this Department; Some Means of Awakening and Maintaining Interest in Agricultural and Other Industrial Education, by E. E. Balcomb, of Oklahoma; and National Aid in the Preparation of Teachers of Agriculture for the Public Schools, by H. H. Seerley.

The second session of this department was devoted to a round-table conference on How May the Rural Schools be More Closely Related to the Life and Needs of the People? led by D. J. Crosby, of this Office, who was assisted in the discussion by Dr. J. W. Robertson, president of Macdonald College; E. T. Fairchild, of Kansas; J. D. Towar, of Wyoming; Mrs. Katherine M. Cook, of Colorado; and others. The topics discussed at this conference included the improvement of the equipment of rural schools, consolidation, the teaching of agriculture, the organization of boys' agricultural clubs, and the training of teachers to meet the new demands made upon them in rural districts.

The third session of the department was devoted to business matters and to the presentation and discussion of the following papers: The Present Status of Agricultural Education in the Public Schools, by E. C. Bishop, of Nebraska; Some Factors in the Making of a High School Course in Agriculture, by Josiah Main, of Tennessee; and Agriculture for the Elementary Schools, by R. O. Johnson, of California. A committee appointed last year reported progress in the matter of securing university credits for high school agriculture to apply on entrance requirements, and at its own request was continued for another year. Another special committee, consisting of E. C. Bishop, Josiah Main, and

R. O. Johnson, was appointed to report next year on a suitable high school course which should include agriculture. The officers elected by this department for the ensuing year were president, K. L. Butterfield, of Massachusetts; vice-president, C. A. Lory, of Colorado; and secretary, E. E. Balcomb, of Oklahoma.

Domestic science instruction was also considered by several departments of the association, as well as by the American Home Economics Association, which met at the same time in Denver. Mrs. E. H. Richards read a paper before the department of elementary education on The Application of the Household Arts and Sciences to the Work of the Elementary School, and in the department of manual training discussed the influence of domestic science on rural and city home life. At the latter meeting the influence of domestic arts on rural and city home life was discussed by Miss Helen Schurz of Kansas. The importance of domestic science teaching was also emphasized by L. D. Harvey and J. W. Robertson in their addresses before the general convention as well as by others who spoke upon the general subject of industrial education.

The American Home Economics Association held three sessions, the first devoted to the discussion of Domestic Science and Art in the High School, Vocational General Training, and College Preparatory; the second to brief addresses on different phases of home economics instruction; and the third to Teachers' Problems in Domestic Art and Science.

A movement which has been under way for a number of years for the reorganization of the departments of the National Education Association culminated at Denver in the adoption of the report of a special committee on reorganization, which reduced the number of departments from 21 to 10. In doing this three departments (physical education, Indian education, and the library) were eliminated entirely. The national council and the departments of higher education, music education, and special education remain as before, while the department of women's organizations becomes the department of school patrons.

The remaining 13 departments will be combined as follows: The department of superintendence and that of school administration into a new department of superintendence; the department of child study and that of normal schools into a department of professional preparation of teachers; the departments of elementary education and kindergarten education into a department of elementary education; the departments of secondary education, business education, and science instruction into a department of secondary education; and the departments of manual training, rural and agricultural education, and technical instruction into a department of industrial education. This last department is also to include domestic science instruction.

The leading officers of the general association elected for the ensuing year were president, J. Y. Joyner of North Carolina; treasurer, Arthur Chamberlain of California; member of board of trustees, J. M. Greenwood of Missouri; member of executive committee, J. H. Phillips of Alabama. I. H. Shepard holds the position of secretary for life.

The reorganization of the association practically nullifies the elections held by the different departments, but the matter of filling these positions was left with the executive committee with power to act.

Thirty-sixth National Conference of Charities and Corrections.—This organization met at Buffalo, June 9–16. A number of the papers dealt with rural conditions and other phases of agricultural work.

In the section of families and neighborhoods, Dean L. H. Bailey discussed Rural Communities, in which he considered the greatest disability at present to be the lack of social and economic organizations. John C. Campbell fol-

lowed with a paper describing conditions among the white people of the Southern mountains, and advocating instruction in agriculture and home economics as related to the needs of the region.

In the children's section, Miss Martha Berry discussed Rural Education among Southern Highlanders.

The section of health and sanitation gave considerable attention to food supplies in public institutions. Dr. C. F. Langworthy, of this Office, took up Nutrition Problems in Public Institutions, on the basis of dietary studies conducted in homes for the insane, orphaned, and aged in Washington, Baltimore, and Philadelphia. A Paper by Dr. H. W. Wiley, of this Department, on The Food Supplies of Charitable and Semicharitable Institutions was read by title, and Dr. H. M. King discussed Diet for Tuberculous Patients. Dr. G. W. Goler gave a stereoptical lecture entitled Milk for Babes.

Seventh International Congress of Applied Chemistry.—This congress met in London, May 27 to June 2, with nearly 4,000 delegates and visitors, representing 26 countries, in attendance. The congress was opened with a brief address by the Prince of Wales as vice patron, to which responses were made by the honorary president, Sir Henry Roscoe, the president, Sir William Ramsey, and representatives of the various foreign countries, Dr. H. W. Wiley, of this Department, responding for the United States.

The sectional meetings were of great interest and importance. A large amount of attention was bestowed upon those phases dealing with chemistry in its relations to agriculture, both in the section of agricultural chemistry and in those of analytical chemistry, sugar chemistry, bromatology, and others.

The new processes for the manufacture of fertilizers from the nitrogen of the air were among the main topics of interest, several sections uniting for their consideration. An experimental demonstration of the processes of manufacture was given by Professor Bernthsen before a large audience, and was followed by addresses by Professors Birkeland and Caro. In the agricultural chemistry section, Dr. Richard Riecke, of Berlin, discussed Lime Nitrogen or Nitrolime on the Nutritive Elements of Plant Life, and Dr. H. von Feilitzen, The New Nitrogen Manures.

The section of analytical chemistry, meeting jointly with that of agricultural chemistry, discussed a proposition for the international adoption of Ullmann's method for phosphoric acid in raw phosphate, but this was defeated. Other papers presented in the section of agricultural chemistry included the following: The Influence of Environment on Wheat, by J. A. LeClerc and S. A. Leavitt, of this Department; The Relation of Composition to Bread-Making Value, by F. T. Shutt, of the Canada Experimental Farms; The Effect of Manures on the Composition of the Grain of Field Crops, by J. W. Leather, imperial agricultural chemist of India; Investigations Relative to the Use of Nitrogenous Manures, by E. B. Voorhees and J. G. Lipman, of the New Jersey stations; Variations in the Analyses of Soil Samples, by I. O. Schaub, of the North Carolina State Station; Changes Produced in Soils by Subjecting Them to Steam under Pressure, by T. L. Lyon and J. A. Bizzell, of Cornell University and Station; A Chemical and Bacteriological Study of Fresh Eggs, by M. E. Pennington, of this Department; Some Studies in Relation to the Incubation of Chickens, by H. L. Fulmer, of the Ontario Agricultural College; and The Employment of Artificial Cultures of Leguminous Bacteria for Soil Inoculation, by H. von Feilitzen.

In the subsection of bromatology, among the papers presented were the following: New Criteria for the National Production of Milk Most Suited to the Nourishment of Infants, and A Comparative Study of the New Methods of Detecting Watering of Milk, by G. Cornalba, of the Royal Experimental

Cheese Making Station, at Lodi, Italy; On the Advantages and Disadvantages of Legally Binding Standards of Composition, by F. W. Beck; Progress Report of Investigations in Human Nutrition in the United States, 1905–1908, by C. F. Langworthy, of this Office; A Summary of Recent American Work in Feeding Stuffs and Animal Nutrition, by E. W. Morse, of this Office; and several papers dealing with the adulteration of coco and chocolate.

An invitation, extended to the congress by Ambassador Reid, on behalf of the United States, to hold the eighth session of the congress in this country was accepted with enthusiasm. Prof. E. W. Morley was elected honorary president, and Dr. W. H. Nichols, president. The next congress will be held in 1912.

Southwestern Interstate Country Life Commission.—At a three-day session, held in May at Guthrie, Okla., a permanent organization of this body, which is to be devoted to the amelioration of country life conditions, was effected by the election of the State superintendents of schools of Oklahoma, Utah, and Texas, as president and vice-presidents, respectively, and of H. M. Ferguson, of Sherman, Tex., as secretary. The next annual meeting is to be held at Dallas, Tex.

First Conservation Congress.—The First Conservation Congress will meet at Seattle, Wash., August 26–28, in the auditorium of the Alaska-Yukon-Pacific Exposition. The work of the congress will deal largely with irrigation, dry farming, soils, water fronts, forestry, transportation, and other economic questions.

National Encouragement of British Agriculture and Forestry.—The chancellor of the exchequer has proposed an increase of the national grant to agriculture by $1,000,000, with a view to more extensive development of the resources of the country. Such projects as the institution of schools of forestry, the purchase and preparation of land for afforestation, the maintenance of experimental forests, increased aid to scientific research in agriculture, experimental farms, the encouragement of agricultural cooperation and better transportation facilities, systematic extension work, and the aiding in a general way of the movement back to the farm are contemplated.

As a partial solution of the problem of the unemployed an extensive afforestation project has been receiving considerable discussion. It is estimated that 9,000,000 acres are available for the purpose and that the annual afforestation of 10,000 acres would afford employment to 18,000 men temporarily and to 1,500 permanently, and eventually yield a large revenue.

New Journals.—*The Journal of Pharmacology and Experimental Therapeutics* is being issued bimonthly, under the editorship of Prof. John J. Abel, of the medical department of the Johns Hopkins University, and a corps of associates and collaborators from the Society for Pharmacology and Experimental Therapeutics and others. The initial number contains, in addition to an editorial, papers as follows: The Comparative Toxicity of the Chlorids of Magnesium, Calcium, Potassium, and Sodium, by D. R. Joseph and S. J. Meltzer; Studies in Tolerance I, Nicotine and Lobeline, by C. W. Edmunds; II, Strychnine, W. Hale; The Mechanism of Hæmolysis with Special Reference to the Relations of Electrolytes to Cells, by G. N. Stewart; Studies Concerning the Iodin-Containing Principle of the Thyroid Gland I, by S. Strouse and C. Voegtlin; The Antagonism of the Adrenal Glands Against the Pancreas, by C. W. Edmunds; and Quantitative Experiments with the Cutaneous Tuberculin Reaction, by C. F. v. Pirquet.

The Cuban Department of Health and Charities has established *Sanidad y Beneficencia* as its organ. The journal will appear monthly, and its original articles will for the most part appear in Spanish, English, and French. Among

the articles in the initial number are several dealing with yellow fever and tuberculosis.

Zeitschrift für Immunitätsforschung und experimentelle Therapie is being issued at irregular intervals. Part 1 of each number is to be devoted to original articles, and part 2 to abstracts of work in immunity and experimental therapy.

O Entomologista Brasileiro is a monthly journal of economic entomology, published at São Paulo, Brazil. Considerable attention is given in the initial numbers to apiculture.

Miscellaneous.—Dr. C. Gordon Hewitt, lecturer in economic entomology in the University of Manchester, has accepted an appointment as entomologist to the Dominion of Canada, vice the late Dr. James Fletcher, and will enter upon his new duties in September.

Francis Watts, analytical and agricultural chemist and superintendent of agriculture for the Leeward Islands, has been appointed imperial commissioner of agriculture for the West Indies, in succession to Sir Daniel Morris, and has entered upon his duties.

Dr. W. Benecke, of the botanical institute of the University of Kiel, has been chosen the successor of Dr. G. Karsten, formerly professor of botany at the University of Bonn.

It is hoped that the new agricultural buildings for Cambridge University will be ready for occupancy in October. The cost with equipment is expected to be about $87,500.

The Fourth National Dairy Show, which will be held October 15–24, has been transferred from Chicago to Milwaukee, where a new auditorium is being completed. H. E. Van Norman, of the Pennsylvania College and Station, has been chosen secretary and manager of the association.

Journal des Sociétés Agricoles du Brabant et du Hainault for March 13 and 27 contains an article on The Function of the Experiment Stations with Reference to the Popularization of Agricultural Knowledge, by P. de Vuyst, which deals largely with the work of the stations in this country.

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. KNIGHT.

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EXPERIMENT STATION RECORD.

VOL. XXI. SEPTEMBER, 1909. No. 3.

The name of Samuel William Johnson will always be intimately linked with the early history and the development of agricultural science in this country, as it will be with the establishment of the agricultural experiment station as an American institution. He was a pioneer of pioneers, a leader of thought, the disciple of a new idea in science. He gave not only results, but an intelligent understanding of their meaning and application; and in the early days of the new work he aroused an interest and confidence in it which went far toward making possible its spread and development.

As teacher, writer, investigator, and guiding hand in the administration of the first experiment station, Doctor Johnson wielded an influence exercised by few men of his time, and was a most potent factor in developing thought and understanding along the line of the relations of science to agriculture. His writings brought together and gave form to the isolated facts bearing upon that subject and laid the foundation for an agricultural science in this country. His greatest work was done before the experiment station movement became national and before popular sentiment had embraced the idea of a system of institutions devoted to scientific work in the interest of practical agriculture. His labors, his studies, and his public utterances prepared the way for the reception of this idea; and the example of usefulness furnished by the station under his direction was a powerful stimulus in propagating this idea and bringing it to fruition in other States.

A thorough scholar, imbued with the spirit of science, as well as its practical applications, he developed in the station high ideals for thoroughness and accuracy and sane methods in the conduct and interpretation of its work. It was first of all a scientific institution, although its ultimate object was practical aid to the farming industry. Its methods must be those of science, and its results must be well substantiated and weighed with a cool judgment which would give reliability to the conclusions and applications. The farmer must be shielded against hasty and immature deductions on the part of the station, as he must against false prophets and charlatans who preyed upon his credulity.

These standards which were set by the Connecticut Station in the early days have meant a great deal in working out a proper conception of these institutions and in winning popular confidence in them.

Doctor Johnson was born in Kingsboro, N. Y., July 3, 1830. His early life was spent upon a large, well-managed farm, where he became familiar with a wide range of agricultural practice. At an early age he developed a taste for natural science, especially chemistry, and he is said to have fitted up a small laboratory of his own on his father's farm. The relations of this science to problems in farming appealed to him and gave him his original direction toward scientific agriculture.

After graduating from Lowville Academy he taught for several years in the common schools, and later gave instruction in natural science in the Flushing Institute, on Long Island, and the State Normal School, at Albany. He entered the Yale Scientific School in 1850, where he came under the influence of Profs. John B. Norton and Benjamin Silliman, jr., and devoted himself especially to the study of agricultural chemistry.

In 1853 he went to Germany, continuing his studies for two years with Liebig, Pettenkoffer, Erdmann, and von Kobell at Munich and Leipsic. He traveled in France and England, giving special attention to the agricultural methods and the institutions in those countries, and spent the summer of 1855 in study with Frankland in England.

Thus well equipped, he returned to this country in the fall of 1855 to become chief assistant in chemistry in the Yale Scientific School, in charge of the laboratory. The following year he was appointed professor of analytical chemistry, and in 1856 he succeeded Prof. John A. Porter in the chair of agricultural chemistry. His title was changed in 1875 to professor of theoretical and agricultural chemistry, and in this capacity he continued to serve in the Sheffield Scientific School until 1896, when, on the completion of forty years of service, he retired as professor emeritus of agricultural chemistry.

Doctor Johnson's writings on agricultural subjects extend back to 1847. They continued without interruption up to the time of his retirement, thus covering a period of more than fifty years. It was through them that his greatest influence was exerted, and they carried his name far beyond the boundaries of this continent. Together with the stimulus he gave to agricultural investigation, they constitute his greatest contribution.

He was a teacher through the written word. He understood well how to make effective the work and writings of others, as well as his own, and this gave to his writings a breadth of view which was especially valuable at the time. He was first of all an earnest student

and a clear thinker, and to these qualities was added the rare gift of expressing himself in clear, concise, logical English and of discussing scientific facts and theories so simply and effectively as to put them within the understanding of those who had no previous acquaintance with such matters.

His first paper, in 1847, was On Fixing Ammonia, and was followed a little later by others on county agricultural institutes, agricultural education, contributions of science to agriculture, What is Science? agricultural charlatanry, the food of plants, and similar topics. The above all appeared prior to 1854, showing how early his thought was turned to matters of popular instruction as well as experiment in agriculture.

Throughout his student days he was a constant contributor to the agricultural press, especially the Cultivator and the Country Gentleman, and during the time he was abroad a series of articles from his pen appeared in the latter paper under the head of "foreign correspondence." These described in popular language the new basis of agriculture as it was being worked out by foreign investigators, together with items of interest from his travels. Among the subjects discussed were Saxon agriculture, the new experiment station at Moeckern—the first to be organized with public funds in any country, the agriculture of Württemberg and the agricultural academy at Hohenheim, and the practical value of analyses of soils and of plants. In 1855 he translated and abridged two of Liebig's works on the relation of chemistry to agriculture, and wrote popularly upon theory and practice in agriculture and the applications of science to the art.

After Doctor Johnson returned to Yale he began the publication of a series of articles on agricultural education, discussing in separate parts the subject of agricultural science, the teaching of science, the means of practical instruction, and the farm school. He likewise continued his popular writings on fertilizers and their use, the theory of plant nutrition, and the physical properties of the soil as affecting fertility.

Prior to 1853 Doctor Johnson took up the examination of commercial fertilizers sold in Connecticut, and in 1858, upon his appointment as chemist to the State Agricultural Society, he began publishing a series of reports upon that subject, which were probably the first to be issued in this country. The early reports of the society and of the board which followed it were enriched by his reports, lectures, and essays, and became classic as an encyclopedia of agricultural science. He delivered a course of lectures on agricultural chemistry at the Smithsonian Institution in 1859, which were subsequently published by the regents of that institution.

In 1868 Doctor Johnson issued his classic treatise on How Crops Grow, a book which has been more widely read and studied than any other work on agricultural chemistry. This book was "a treatise on

the chemical composition, structure, and life of the plant," and embodied the results of his studies and compilations for his courses of instruction. It gave a new basis for the teaching of agriculture, as well as a broader understanding of the principles and the reasons of farm practice. It was received with great favor in this country and in Europe, and was reprinted in England, and translated into the German, Russian, Swedish, Italian, and Japanese languages.

Two years later the companion volume, How Crops Feed, was issued, which was similarly translated and widely used. These two books presented in small compass and with unsurpassed clearness and conciseness the state of knowledge of agricultural science at that time. The author's object, as expressed by him, was "to digest the cumbrous mass of evidence in which the truths of vegetable nutrition lie buried out of the reach of the ordinary inquirer, and to set them forth in proper order and in plain dress for their legitimate and sober uses." He did not aim "to excite the imagination with high-wrought pictures of overflowing fertility as the immediate result of scientific discussion or experiment," and disclaimed any attempt "to make a show of revolutionizing his subject by bold or striking speculations." This was characteristic of the man. It was his cool, judicial weighing of the evidence and presentation of results in a clear, dispassionate way that gave these two books their scientific value and commended them to students of agriculture in the school and on the farm. They were the beginning of a new and better agricultural literature.

The movement for the establishment of an experiment station in Connecticut started as early as 1856. Doctor Johnson was familiar with the new German stations and from his studies had become imbued with the possibilities for benefit which might follow agricultural investigation. His books and other writings, as well as his work, had stimulated public interest in the subject.

The papers and discussions of the Connecticut Agricultural Society and the State board of agriculture, notably those of Doctor Johnson and his fellow-workers, supplied the germ of the new experiment station idea. This idea was at length realized in the establishment of a station at Middletown in 1875, under the directorship of Prof. W. O. Atwater, which two years later was removed to New Haven and more permanently provided for, with Doctor Johnson at its head.

The beginning was precarious. The station was a new plant to this continent. A farmer appearing before the agricultural committee in opposition to the bill establishing the station said, "I tell you, go slow. You are hatching an egg which will certainly make this State a lot of trouble." The new institution was thus on trial, and upon its ability to make good hinged the spread of the move-

ment to other States. That it met the requirements and established popular confidence is a matter of history.

Professor Johnson's work for years past had shown that the farmers were losing a great deal of money through inferior and carelessly made fertilizers and through ignorance in the use of them. This showing supplied the argument for a station which appealed to the people, and it is doubtful whether a station could have come at that time and place through other means.

At the beginning, therefore, the defense work was a necessary and most important part of the station's work. It was the first and most obvious thing which needed to be done for the benefit of agriculture. While it was not regarded by those in charge as being the most ideal work which a station could perform, at the time it was the approach through which the ideal had to be reached.

The first bulletin issued by the station under Doctor Johnson's direction was in his own handwriting, and has been reproduced by the station as a matter of historic interest. It reported upon a fertilizer known as "Composition for Grass," which was being sold under the representation that it contained 86 per cent of "organic and soluble plant food," and 14 per cent of inorganic matter. It was found to carry only 0.19 per cent of nitrogen, 0.15 per cent of potash, and 0.37 per cent of phosphoric acid, on which a valuation of $1.03 per ton was calculated, whereas the selling price was $32.

Doctor Johnson's significant comment is that "as analyzed the sample contains but 4 per cent of 'plant food;' 96 per cent is water, vegetable matter, and earth, not worth barreling." The material proved to be the dried product from a mud flat near New Haven, and the publication of the fraud led the manufacturer to transfer his operations to another State.

While this is not to be taken as representative of the fertilizers of that day, it shows the kind of fraud which was perpetrated and was possible to be carried on a little more than thirty years ago. Such frauds damaged not only the farmer, but they damaged the makers of honest fertilizers almost irreparably, by bringing the whole business into unjust suspicion and disrepute.

The thorough, conscientious, and efficient system of fertilizer inspection which Doctor Johnson developed has been a model to many other States, and helped to establish confidence in the trade. Upon it has been built a station renowned for the scope and high character of its defense work, which has been extended to include human foods, stock feeds, seeds, insecticides, and other products of interest to agriculture.

But the exclusively control station was not Doctor Johnson's ultimate ideal. The aim of the station, as stated in the act of incorporation, was "to promote agriculture by scientific investigation and

experiment," and that this ideal was clear in his mind is evident both from his work and his writings. The study of analytical methods received much attention from the first, and, with his assistants, he made many contributions upon methods and apparatus for improving the accuracy and rapidity of various determinations. The relations of the soil to water, capillary transmission and evaporation, and soil temperature studies formed a part of his earlier work.

These laboratory studies were developed and broadened as time went on, and were extended to field experiments to test the needs of the soil and the comparative value of various fertilizing materials. The most extensive experiments of that kind were a series begun by the station in 1892, in cooperation with a tobacco growers' organization, and continued for a period of five years.

In 1882 the station, which had previously been housed in rooms of the Sheffield Scientific School, was removed to its present location, on grounds purchased by the State. At that time there were only eight such institutions in this country, and the Connecticut Station was regarded as a model in work and equipment. Its influence upon the national movement which culminated five years later was unmistakable, and its reports were much in demand for showing the character and usefulness of experiment station work.

Doctor Johnson took a deep interest in the movement for the establishment of stations throughout the country, as he did in the organization of the new stations and the working out of what has come to be regarded as the American system, a system distinct in itself, and an adaptation of the European station to the conditions and requirements of this country.

Although a modest and retiring man, many honors of public office came to him. He was president of the American Chemical Society in 1878, chairman of the subsection of chemistry of the American Association for the Advancement of Science in 1875, a member of the National Academy of Sciences from 1866, an associate fellow of the American Academy of Arts and Sciences, and in 1895 president of the Association of American Agricultural Colleges and Experiment Stations. He retired from the directorship of the Connecticut Station in 1899, and since that time ill health has prevented his participation in the work with which his life was so prominently identified. He died at his home in New Haven July 21, in his eightieth year.

The career of this man is a monument to industry and to untiring devotion in behalf of a cause which appealed to him from his youth. As a teacher of agricultural teachers, as a leader in agricultural science, and as a father and promoter of the movement to bring the sciences to the aid of the farmer through the experiment stations, Doctor Johnson rendered signal service to the cause of agricultural advancement, and has left a name to be remembered with great honor.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY.

The preservation of iron and steel, A. S. CUSHMAN (*U. S. Dept. Agr., Office Pub. Roads Bul. 35, pp. 40, pls. 4*).—This is a continuation of studies previously reported (E. S. R., 19, p. 306), and has a direct bearing upon the preservation of fence wire and other forms of iron and steel in general use. The controlling factors which influence the more or less rapid corrosion of iron and steel are discussed in the light of the electrolytic or autoelectrolytic theory of rust formation. The various methods which are in common use, or which have been proposed for the protection of iron and steel, are then considered with special reference to the results of recent investigations, and principles are announced to serve as a guide in the selection of paints for the prime or contact coatings for steel.

Iron combines so readily with other elements that commercial iron is not a homogeneous pure metal, and the presence of small quantities of impurities serves to change its physical characters. The ferroxyl test, which is described in detail, affords a visible demonstration of electrolytic action taking place on the surface of iron and causing rapid corrosion at the positive poles.

"This electrolytic action, which is shown to take place whenever iron rusts, should not, however, be confused with the rapid destruction of steel in the neighborhood of escaped currents from high potential circuits used for electric lighting or tramways. In order to avoid such confusion of terms and ideas, it has been proposed to speak of the underlying electro-chemical cause of corrosion as autogenous electrolysis or, more briefly, autoelectrolysis."

The electro-chemical explanation of the corrosion of iron is stated as follows:

"Iron has a certain solution tension, even when the iron is chemically pure and the solvent pure water. The solution tension is modified by impurities or additional substances contained in the metal and in the solvent. The effect of the slightest segregation in the metal, or even unequal stresses and strains in the surface, will throw the surface out of equilibrium, and the solution tension will be greater at some points than at others. The points or nodes of maximum solution pressure will be electro-positive to those of minimum pressure, and a current will flow, provided the surface points are in contact through a conducting film. If the film is water, or is in any way moist, the higher its conductivity the faster iron will pass into solution in the electro-positive areas, and the faster corrosion proceeds. Positive hydrogen ions migrate to the negative areas, negative hydroxyls to the positives. . . . The rusting of iron is primarily due to attack, not by oxygen, but by hydrogen in its ionized condition. Nevertheless, the function of oxygen in carrying on the process of rusting, although a secondary one, is absolutely essential to its progress, for in the absence of oxygen rust is not formed. It is owing to these separate, though coordinated, functions of hydrogen and oxygen that the formation of rust can be inhibited by the addition to the water of certain oxidizing agents, as well as by certain reducing agents, a seeming paradox that no other theory attempts to explain. The strong reducing agent pyrogallol will inhibit rusting by inter-

ference with the function of the oxygen, while such conspicuous oxidizing agents as chromic acid and its soluble salts, by inducing a passive condition, interfere with the action of the hydrogen ions."

The efficiency of preserving iron by coating it with different substances is discussed. Samples of wire coated with zinc by various processes have been put up in the form of a fence to test the inhibitive effect of zinc, and other materials are also under test. Laboratory tests were undertaken by different investigators to ascertain the value of pigments as rust inhibitors, and from their results a tentative classification of the pigments is proposed in the following table:

Classification of pigments.

Inhibitors.	Indeterminates.	Stimulators.
Zinc lead chromate.	White lead (quick process; basic carbonate).	Lampblack.
Zinc oxid.	Sublimed lead (basic sulphate).	Precipitated barium sulphate (blanc fixe).
Zinc chromate.	Sublimed blue lead.	Ocher.
Zinc and barium chromate.	Lithopone.	Bright red oxid.
Zinc lead white.	Orange mineral (American).	Carbon black.
Prussian blue (inhibitive).	Red lead.	Graphite No. 2.
Chrome green (blue tone).	Litharge.	Barium sulphate (barytes).
Whitelead (Dutch process).	Venetian red.	Graphite No. 1.
Ultramarine blue.	Prince's metallic brown.	Chinese blue (stimulative Prussian).
Willow charcoal.	Calcium carbonate (whiting).	
	Calcium carbonate (precipitated).	
	Calcium sulphate.	
	China clay.	
	Asbestine.	
	American vermilion.	
	Medium chrome yellow.	

"If we apply the autoelectrolytic theory of the cause of corrosion to the subject of protection by paint films, it follows that in general pigments that are good conductors of electricity should never be applied directly to the surface of iron or steel."

Acceleration tests of a number of pigments made with water according to a simple method described in detail were found to agree with the oil-film test previously used.

It is pointed out that the protection of a metal which from the nature of its service can not be treated with a protective coating is purely a metallurgic problem to be solved by the manufacture of a perfectly homogeneous and carefully worked material. "If anyone should discover a method for applying a skin of high silicon metal on worked steel it would be a contribution of the highest value to the art of metallurgy and to the world at large."

A method for the quantitative determination of nitrogen in very small amounts, E. A. MITSCHERLICH, P. HERZ, and E. MERRES (*Landw. Jahrb., 38 (1909), No. 2, pp. 279–318, figs. 2; Landw. Vers. Stat., 70 (1909), No. 5–6, pp. 405–411, figs. 2; abs. in Chem. Zentbl., 1909, I, No. 14, pp. 1195, 1196*).—The method proposed by the authors, which is adapted especially to the determination of small amounts of nitrogen as in bacteriological investigations, is in brief as follows:

To the solution containing from 3 to 10 mg. of nitrogen in a Kjeldahl flask add 3 gm. of Devarda's reagent. Connect with a Hugershoff distillation apparatus, add 50 cc. of concentrated sodium hydrate and distill into 10 cc. of normal sulphuric acid, then add 50 cc. of water and 60 cc. of concentrated sulphuric acid to the Kjeldahl flask, and heat until the mass becomes blue. To the distillate obtained add zinc filings and distill after adding 120 cc. of concentrated sodium hydrate, collecting the distillate in fiftieth-normal sulphuric

acid and titrating with fiftieth-normal sodium hydrate, using congo red as an indicator.

The determination of total nitrogen according to Mitscherlich, E. MERRES (*Ztschr. Angew. Chem., 22 (1909), No. 14, pp. 631, 632; abs. in Chem. Zentbl., 1909, I, No. 18, pp. 1503, 1504*).—A brief description of the method noted above, its advantages, and the precautions to be observed to insure accuracy.

The use of nitron for the determination of nitric acid in solutions containing much organic matter, H. FRANZEN and E. LÖHMANN (*Jour. Prakt. Chem., n. scr., 79 (1909), No. 7–8, pp. 330–338; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 546*).—Tests are reported which show that Busch's nitron method gives good results in the presence of relatively large amounts of organic matter, as for example, in culture solutions, provided 2 to 2.5 cc. of concentrated sulphuric acid be added for each 200 cc. of solution.

The determination of ammonia without a condenser, R. O. E. DAVIS (*Jour. Amer. Chem. Soc., 31 (1909), No. 5, pp. 556–558, fig. 1*).—The essential feature of the apparatus described is an absorption device consisting of a Folin tube supplemented by a tube filled with glass beads moistened with acid, the ammonia being swept into the absorption device from the digestion flask by means of a rapid current of air.

The determination of phosphoric acid in fertilizers by Pemberton's modified method and by von Lorenz's method, D. J. HISSINK (*Chem. Weekbl., 6 (1909), No. 12, pp. 181–191; abs. in Chem. Zentbl., 1909, I, No. 15, p. 1268*).—The author's modification of Pemberton's method has been previously noted (E. S. R., 17, p. 6). The results obtained by this modified method agreed very well with those of the von Lorenz method. In 108 determinations made with both methods the average variation was only 0.04 per cent. The von Lorenz method is somewhat quicker than the Pemberton method, but the former uses the more material.

The use of the method is extended to include the determination of phosphoric acid in acid-soluble phosphates, as follows: Boil 5 gm. of substance for one-half hour in 150 cc. of water, 40 cc. of nitric acid (1.2 sp. gr.), and 10 cc. of 25 per cent hydrochloric acid, cool, dilute with water to 500 cc., filter, and proceed as usual.

A discussion of methods for determining the availability of phosphoric acid in Thomas phosphate powder (basic slag phosphate), with a complete transcript of Wagner's method, G. D. LEAVENS (*1908, pp. 39, figs. 2*).—This is a summary of information regarding the composition of Thomas slag, the availability of its phosphoric acid as shown by field experiments, and the relative merits of different chemical methods of determining availability. The Wagner method is recommended as giving the most satisfactory results.

A rapid method for the determination of total potassium in soils, O. M. SHEDD (*Jour. Indus. and Engin. Chem., 1 (1909), No. 5, pp. 302–304*).—The method proposed, which is stated to be applicable not only to potash in soils but to silicates generally, "is a combination of the J. Lawrence Smith method with the cobalti-nitrite method of W. A. Drushel, the potassium being brought into solution by the former method and determined by the latter, without previous separation of the calcium."

The determination of carbon by means of the bomb calorimeter, J. A. FRIES (*Jour. Amer. Chem. Soc., 31 (1909), No. 2, pp. 272–278, fig. 1*).—From comparative determinations which the author reports the conclusion is reached that carbon dioxid can be very accurately determined with the Atwater-Berthelot bomb.

From his tests of determinations of hydrogen the author concludes that "by means of the bomb calorimeter it is possible also to determine hydrogen, but it is a much more difficult and tedious operation, and it is very hard on the bomb, and with the kind of bombs in use at present, the writer considers it too costly and hence impracticable. Trials were made and it was found that the escaping acids attack the apparatus too much; but as soon as the bomb can be made with platinum or other noncorroding lining all through the gas outlet, a method for hydrogen can doubtless be worked out successfully."

Rapid and direct estimation of water in foods, condiments, and other materials, THÖRNER (*Südd. Apoth. Ztg., 1908, p. 585; abs. in Pharm. Praxis, 7 (1908), No. 8, pp. 363, 364*).—In this method water is driven out of the material by distillation with petroleum ether, collected, and measured. The results which the author obtained with milk and milk products, sausage, bread, etc., agree very well with those obtained in the usual way.

The chemical constitution of the proteins, R. H. A. PLIMMER (*New York, Bombay, and Calcutta, 1908, pts. 1, pp. XII+100; 2, pp. VIII+66*).—In this series of monographs on proteins the subjects considered are the chemical composition of the protein molecule, the chemical constitution of its units, or the discovery and syntheses of the amino acids, the condensation together of amino acids, and the synthesis of the proteins. Each part contains a bibliography and an index.

The hydrolysis of egg white with sodium hydroxid solution, Z. H. SKRAUP and F. HUMMELBERGER (*Monatsh. Chem., 30 (1909), No. 2, pp. 125–145*).—A progress report of cleavage studies with egg albumin.

Hydrolysis of vitellin from the hen's egg, T. B. OSBORNE and D. B. JONES (*Amer. Jour. Physiol., 24 (1909), No. 1, pp. 153–160*).—The analytical results are discussed in comparison with earlier work.

"The most striking difference, and one which we can not explain, is shown by glycocoll, which we were wholly unable to find, although persistent efforts were made to do so. The difference between the percentage of aspartic acid . . . [in the authors' analysis and one quoted for comparison] is relatively large, but from such data as are now available it would appear that determinations of aspartic acid are among the most uncertain of all of the protein decomposition products. We made no attempt to determine cystin or oxyprolin."

Hydrolysis of the muscle of scallop, T. B. OSBORNE and D. B. JONES (*Amer. Jour. Physiol., 24 (1909), No. 1, pp. 161–169*).—The results obtained in the hydrolysis of scallop (*Pectens irradians*) muscle are reported in comparison with those of similar studies of halibut and chicken.

"The scallop muscle . . . resembles that of halibut and chicken in respect to the small proportion in which the lower amino acids are yielded by hydrolysis.

"The amount of glutaminic acid is nearly the same as that obtained from chicken muscle, but decidedly greater than that from the fish muscle.

"The scallop muscle yields distinctly more arginin and less lysin than the other two muscles, and in this respect shows a distinct difference which is greater than any probable error involved in the analysis."

Electrolytes and colloids. The physical state of gluten, T. B. WOOD and W. B. HARDY (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 545, pp. 38–43, dgms. 2*).—A study of gluten by physical chemical methods.

The quantitative estimation of muscle albumin and myosin in meat of different sorts, G. BONAMARTINI (*Ann. Ig. Sper., n. ser., 18 (1908), No. 2, pp. 235–251; abs. in Biochem. Zentbl., 8 (1909), No. 10, p. 551*).—The author insists on the need of such determinations, gives some results, and outlines his method of analysis.

The examination of flour, E. SCHAFFNIT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 2, pp. 86–88, fig. 1*).—A separating funnel is described which the author considers of use in the microscopical and colorimetric examination of flour.

On the determination of reducing sugars, F. ZERBAN and W. P. NAQUIN (*Internat. Sugar Jour., 10 (1908), No. 115, pp. 328–332*).—A critical study of methods.

According to the authors, "in the determination of reducing sugars in low-grade sugar products the quantity of metallic copper present in the precipitate should always be determined. If that be done, clarification with just a sufficient amount of neutral lead acetate may not be necessary in all cases, but it is advisable to use it, because it will remove at least a part of the reducing nonsugars without affecting the sugars. . . .

"It appears that in the analysis of low-grade products the volumetric method is preferable to the gravimetric, because the errors produced by the precipitation of organic and mineral matters are avoided, and fairly accurate results may be obtained in much less time."

The use of temperature corrections in the polarizations of raw cane sugar, C. A. BROWNE (*La. Planter, 42 (1909), No. 12, pp. 185, 186*).—A comparison and discussion of methods in use at the U. S. Treasury Department in the assessment of duty upon raw cane sugar.

The detection of caramel in vanilla extract, A. G. WOODMAN and E. H. NEWHALL (*Technol. Quart., 21 (1908), No. 3, pp. 280–287*).—"The procedure found to give the best results in this investigation and recommended for use is as follows: 15 cc. of the extract are mixed with 2 cc. of zinc chlorid (5 per cent solution), and 2 cc. of caustic potash (2 per cent solution) are added. The precipitate is filtered, washed with hot water, and dissolved in 15 cc. of acetic acid (10 per cent solution). This is concentrated to about half its volume, the excess acid neutralized, and the solution divided between two test tubes. To one of these three volumes of paraldehyde are added and just sufficient alcohol to make the mixture homogeneous. To the other tube an equal volume of a mixture of 2 parts phenyl-hydrazin hydrochlorid, 3 parts sodium acetate, and 20 parts water is added. Both tubes will show a brown, flocculent precipitate after standing over night if caramel be present."

The Schmitt process for determining the total extract material in wine, F. SCURTI and G. DE PLATO (*Staz. Sper. Agr. Ital., 41 (1908), No. 9–11, pp. 681–688*).—Analyses of a number of samples of wine are reported.

The determination of total sulphur in urine, O. FOLIN (*Jour. Amer. Chem. Soc., 31 (1909), No. 2, pp. 284, 285*).—In this note the author discusses criticisms of his method of determining total sulphur in urine (E. S. R., 20, p. 1106).

On the detection and quantitative determination of rice hulls in feeding stuffs, F. SCHRÖDER (*Arb. K. Gsndhtsamt., 28 (1908), No. 1, pp. 213–224, figs. 6, dgm. 1*).—Though the presence of rice hulls can be easily detected by the microscope, the extent to which feeds may be adulterated with them can only be determined by chemical analysis. Rice hulls contain more silicic acid than other feeding stuffs, and a method of determining the amount of this acid is described by the author as affording a convenient means for detecting the extent of adulteration.

Milk testing without apparatus, G. MICHAUD (*Sci. Amer., 100 (1909), No. 17, p. 320, fig. 1*).—This article describes a method for testing milk suspected of having been skimmed or adulterated with water. It is claimed that if the milk has been skimmed or watered this can be readily detected by its opacity

when a sample diluted with 50 volumes of water is observed through the bottom of a glass held about 1 ft. above a lighted candle.

A new apparatus for the determination of catalase in milk. R. Burri and W. Staub (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 2, pp. 88, 89, fig. 1; Rev. Gén. Lait, 7 (1909), No. 12, pp. 272–274, fig. 1; abs. in Analyst, 34 (1909), No. 397, p. 160, fig. 1*).—This apparatus has been previously noted (E. S. R., 20, p. 1011).

The detection of coconut oil in butter and lard. G. Fendler (*Arb. Pharm. Inst. Univ. Berlin, 5 (1907), pp. 261–278, figs. 2*).—Analytical data of butter, lard, and mixtures of the same with coconut oil are reported. The methods employed are based on the fact that the nonvolatile lauric and myristic acids are soluble in 60 per cent alcohol. Because of the large amount of these acids in coconut oil an addition of 10 per cent to butter can be detected. In testing for adulterations of lard the Reichert-Meissl value must also be taken into consideration. Palm oil as an adulterant can be detected in the same way, though a distinction between palm and coconut oils can not be made with this method. Tests are also reported for detecting coconut oil by means of the melting points of the different ethyl esters of the fatty acids.

Color reaction of oleic acid, A. Manea (*Bul. Soc. Sti. Bucarești, 17 (1908), No. 3–4, pp. 256, 257; abs. in Chem. Zentbl., 1908, II, No. 20, p. 1702; Jour. Chem. Soc. [London], 96 (1909), No. 556, II, p. 190*).—Vegetable fibers when mixed with oleic acid or its esters and strong sulphuric acid give a red coloration on the addition of water. This reaction may be used for identifying oleic acid and for distinguishing between vegetable and animal fibers.

Official method of the American Leather Chemists Association for tannin analysis (*Jour. Amer. Leather Chem. Assoc., 4 (1909), No. 5, pp. 118–138*).—These methods include directions for taking and preparing the samples, analysis of extracts, liquors, oils, fats, etc.

Ethereal oils, H. Haensel (*Abs. in Jour. Chem. Soc. [London], 96 (1909), No. 556, I, pp 111, 112*).—This report contains analytical data on oils from a large number of plants of commercial value.

Essential oils (*Semiann. Rpt. Schimmel and Co., 1908, Nov., pp. 5–232, pl. 1, figs. 22; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 556, I, pp. 112–115; Chem. Zentbl., 1909, I, No. 19, pp. 1564–1566*).—A collection of data on commercial oils, much of which has been abstracted in various journals.

Animal fats and oils, W. H. Bentley (*Sci. Amer. Sup., 67 (1909), No. 1738, pp. 270, 271*).—This is a brief popular account of the preparation of commercial grades of lards, tallows, oils, and greases.

Report of the chemical division, B. L. Hartwell (*Rhode Island Sta. Rpt. 1908, pp. 232–242*).—This is a summary account of work during the year on the effect of sodium on plant composition, form of phosphorus in turnips, availability of nitrogenous manures, nitrogen gathering value of legumes, the wire-basket method for determining the manurial requirements of soils, soda as a supplement to potash as a plant nutrient, fertilizing value of potash in feldspar, effect of acid and of ferrous sulphate on seedlings, feeding stuffs and fertilizer inspection, and analyses of miscellaneous materials, including sludge, wool dust, dried blood, dissolved bone, ground bone, sulphate of ammonia, nitrate of soda, potassium nitrate, sulphate, muriate, and carbonate, common salt, sodium carbonate, ground limestone, chicken feeds, and molasses.

Labor and time saving apparatus in American analytical laboratories, V. Samter (*Ztschr. Chem. Apparatenk., 3 (1908), No. 24, pp. 569–573, figs. 6; abs. in Chem. Zentbl., 1909, I, No. 11, p. 885, figs. 2*).—The apparatus described include a grinding apparatus, an automatic sampler, a filtering apparatus, and the Jones reductor.

Chemical problems in the province of bacteriology, A. REITZ (*Ztschr. Angew. Chem., 22 (1909), Nos. 3, pp. 100–107; 4, pp. 156–163*).—It is shown in this article that bacteriological investigations furnish a series of new and interesting chemical problems and points of view.

METEOROLOGY—WATER.

Meteorology, H. D. EDMISTON (*Pennsylvania Sta. Rpt. 1908, pp. 179–192, 245–273*).—The observations here recorded are of the same character as those reported in previous years (E. S. R., 20, p. 312). The summary for 1907 is as follows:

Summary of meteorological observations, 1907.

	1907.	Growing season (Apr.–Sept.).
Barometer (inches): Mean	30.010	
Temperature (° F.):		
Mean	45.9	57.
Highest	88 (Aug. 12)	88 (Aug. 12).
Lowest	−10 (Jan. 24)	16 (Apr. 2).
Greatest daily range	43 (Dec. 22)	36 (Aug. 19).
Least daily range	2 (Dec. 16)	
Mean daily relative humidity (per cent)	84.4	80.5.
Rainfall (inches)	39.98	21.55.
Number of days on which 0.01 in. or more of rain fell	138	68.
Mean percentage of cloudiness	51.3	49.3.
Number of days on which cloudiness averaged 80 per cent or more	106	56.
Last frost in spring		May 22.
First frost in fall		Oct. 6.

Climatology of Oklahoma (*Bien. Rpt. Okla. Bd. Agr., 1 (1907–8), pt. 8, pp. 8*).—Observations on temperature, dates of killing frosts, precipitation, cloudiness, and prevailing winds from 1893 to 1908 are summarized by the director of the State weather service.

Report of meteorologist, N. HELME (*Rhode Island Sta. Rpt. 1908, pp. 325–341*).—Observations at Kingston on temperature, precipitation, prevailing winds, and general character of the weather are given for each month of the year ended June 30, 1908. The mean temperature for that period was 48.5°, the precipitation 53.75 in., and the number of clear days 158.

Meteorology (*Imp. Dept. Agr. West Indies, Rpt. Agr. and Bot. Depts. Barbados, 1898–1907, pp. 31–37, dgms. 2*).—This report gives observations on pressure, temperature, rainfall, and wind made at the botanic station, Barbados, as well as rainfall returns for the island for the year 1906, with tables showing averages of the general meteorological observations for the past 10 years and the average rainfall of the island for 60 years (1847–1906) as related to the crop of sugar exported each year during the same period.

An attempt is made to show the relation between rainfall and sugar production by means of diagrams. The rainfall curves show distinct evidence of periodicity in precipitation and that there were wet years around 1853, 1864–65, 1879, and 1895, while the dry periods centered around 1858, 1871, 1883–84, and the present time. The sugar crop curves show no direct relationship between rainfall and sugar production. The curve of production runs from its lowest point in 1847 to its highest point about 1889, and since that year has decidedly decreased.

Meteorological observations in Moscow in 1907, E. LEYST (*Bul. Soc. Imp. Nat. Moscou, 1907, No. 4, pp. 552–591*).—Observations on pressure, air and soil

temperature, radiation, humidity, cloudiness, sunshine, precipitation, wind movement, and casual phenomena are summarized and discussed.

Vertical temperature-gradients of the atmosphere, especially in the region of the upper inversion, W. J. HUMPHREYS (*Astrophys. Journ., 29 (1909), No. 1, pp. 14–32, fig. 1; abs. in Sci. Abs., Sect. A—Phys., 12 (1909), No. 135, pp. 467, 468*).—"After summarizing the present state of our knowledge of the distribution of the vertical temperature-gradient in the atmosphere and the various hypotheses to explain the existence of the upper inversion or isothermal layer, the author proceeds to offer an explanation of the latter, based on consideration of the amount of radiation received by it from the sun and the earth respectively."

On the mechanical energy of precipitation, H. REISNER (*Met. Ztschr., 26 (1909), No. 2, pp. 85–87, figs. 2*).—Equations and formulas for estimating the energy are given and applied to certain European areas of known rainfall.

On the influence of forests on rainfall and the probable effect of "déboisement" on agriculture in Mauritius, A. WALTER (*Mauritius: Govt., 1908, pp. 54, pls. 6, figs. 4; rev. in Nature [London], 78 (1908), No. 2033, pp. 610, 611; Met. Ztschr., 26 (1909), No. 2, pp. 87, 88*).—The forest cover has been reduced from one-third of the total area of the island in 1850 to about one-tenth in 1880 and further clearing has occurred since the latter date. A study of the rainfall data, especially from 1860 to 1907, gives "evidence that the cutting of the forests may have had some little effect on the total fall, but has had more effect on the number of rainy days. . . . The rainy days in the districts denuded of forests have been decreased by about 30 days per year, but under such conditions that the amount due to these 30 days is only about 6 to 10 in., whereas the annual variation of total rainfall is often 60 in. Before the forests were cut rain fell on many calm afternoons, because the presence of moisture transpired by the trees was sufficient by increasing the humidity and decreasing the pressure to cause slight showers. The rain caused in this way is, however, very local."

The effect of forests on rainfall (*Indian Forester, 34 (1908), No. 10, pp. 571–573*).—An argument based upon investigations by E. Henry is presented to show "that if we wish to maintain the present rainfall of the world, we must necessarily maintain the present area of forests in the world, or, if we desire to increase the rainfall, we must increase the forest area by afforestation of waste lands."

Cause and effect of the gradual disappearance of forests on the earth's surface (*Indian Forester, 34 (1908), No. 10, pp. 600–604*).—This is a review of an article by Ducamp, setting forth the injury which results from destruction of forests as regards water supply and other physical conditions of the earth's surface.

It is stated that "the effect on the physical state of the earth's surface of the gradual disappearance of forest growth which is the natural covering of the land, is one which necessarily takes place so extremely slowly that it is very likely to escape observation, or, even when perceived, to have its importance undervalued."

Deforestation, drainage, and tillage, with special reference to their effect on Michigan streams, R. E. HORTON ([*Mich. Engin. Soc.*], *pp. 23, pl. 1, figs. 6*).—In this article an attempt is made to compare present conditions of forest growth, drainage, and tillage in northern and southern Michigan with the primeval conditions in those regions, with especial reference to their effect on the flow of streams. It is pointed out that "arguments from common observations are of little value. Reliable conclusions as to the effect of forests on streams can only be drawn after careful study with full knowledge of the available hydrophysical data."

The author reaches the conclusion that "contrary to prevailing opinion, deforestation does not of itself always result in drying up of streams and increase in floods. The usual result is an increase both in the average flow and in the flood flow. In regions like southern Michigan the effect of deforestation on stream flow is very likely to be less than the effect of subsequent drainage and tillage."

Water purification and similar processes, P. ASKENASY (*Jahrb. Elektrochem., 12 (1905), pt. 2, pp. 679–683, fig. 1*).—The literature of electrochemical processes for this purpose proposed in 1905 is noted.

Principles of sewage treatment, W. P. DUNBAR, trans. by H. T. CALVERT (*London, 1908, pp. XXIII+271, figs. 147*).—This book attempts to group and critically describe the various phases of development of sewage treatment.

The section dealing with surface irrigation is of particular interest from the agricultural standpoint. It deals with the methods used and their efficiency, and the utilization of sewage as manure. It discusses this method of sewage disposal from the economic and sanitary standpoints, pointing out the fact that economic and sanitary interests are necessarily more or less in conflict in that methods of application that will give maximum crop production will not secure satisfactory purification of the sewage.

Sewage purification abroad, H. W. CLARK (*Jour. Assoc. Engin. Soc., 41 (1908), No. 5, pp. 231–272, pls. 8, figs. 2; abs. in Municipal Jour. and Engin., 26 (1909), No. 4, pp. 125–128, figs. 6*).—Information obtained by an inspection of sewage purification works in England and Germany during the summer of 1908 is summarized. The information relates to sewage farming, contact filters, and sprinkling filters, with notes on preliminary treatment.

The author found sewage farming in successful use in many places in England, particularly at Wolverhampton. "This city has a population of 102,000, and an ordinary sewage flow of 3,000,000 gal. per day. This is first treated with lime, and, after settling in tanks, is turned onto a farm of 600 acres, of which 450 are used for this purpose. The sludge is pressed into cakes and is burned or used for filling. This farm is underdrained with tile. Like so many English cities, this one is sewered on the combined system and the storm water is brought to the disposal plant, where it is turned into a reservoir 11 acres in area with 3-ft. embankments, in which it slowly filters away through the gravelly bottom. The effluent from the works is equal to that of the best Massachusetts sand filters. Up to the end of March, 1908, the works had cost $750,000, or about $7.50 per head of population. The cost of operation for the year previous, less the profit from the farm, was $26,000, and the interest and sinking fund payment would add about $30,000 to this. The average rate of filtration is about 8,000 gal. per acre per day. This gives a cost, including fixed expenses, of about $49 per milion gallons treated."

The recent report of the Royal Commission on Sewage Disposal states as one of its conclusions that where land can be bought for not over $500 per acre land treatment is probably, other things being equal, the cheapest method of sewage purification.

The nonsuccess of many English sewage farms is attributed by the author to the fact that the soils, while well suited to farming, are poorly adapted to sewage purification.

High nitrification of sewage effluents, W. D. SCOTT-MONCRIEF (*Jour. Roy. Hort. Soc. [London], 34 (1909), No. 3, pp. 462–468, fig. 1*).—This paper describes a simple method of obtaining highly nitrified sewage effluents for use in horticulture. The arrangement used consists essentially of "a sereis of superimposed trays, each containing suitable filtering material, so that the liquid could drip from one to the other, with an ample provision of air in the spaces

between the trays." This form of filtration is considered practical only on a small scale, but may be used with advantage in certain horticultural work.

Report on the sewage irrigation farm of Gennevilliers (*Bul. Mens. Off. Renseig. Agr. [Paris]*, 8 (*1909*), *No. 2, pp. 130–134*).—This is a brief report upon the operations of this farm during 1907 and 1908, including detailed statistics of the amounts of sewage water handled during the years 1905 to 1908.

Agricultural utilization of sewage (*Jour. Off. Répub. Franç., 41 (1909), No. 41, pp. 1425, 1426; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 16, p. 504; Jour. Agr. Prat., n. ser., 17 (1909), No. 7, pp. 194, 195*).—The official report on the utilization of sewage on the Gennevilliers farm noted above is given, with discussion of the principal facts of agricultural importance brought out in the report. It is indicated that from the standpoint of sewage disposal the results have not been entirely satisfactory, and that in order to secure profitable returns in crop production it is necessary to use the sewage in such large amounts that complete purification is not secured. The use of peat beds according to the Müntz method has been introduced to secure more perfect purification.

SOILS—FERTILIZERS.

Maintenance of soil fertility: Plans and summary tables (*Ohio Sta. Circ. 92, pp. 32, dgms. 6*).—This circular supplements Bulletin 184 of the station (E. S. R., 20, p. 428) and brings the data of experiments on maintenance of soil fertility begun in 1893 up to the end of the year 1908. The plans and tables are arranged for convenient reference in the field. Among the more important facts brought out by the results of the experiments to date are the following:

"In the case of the crops grown continuously on the same land there has been a rapid falling off in yield during recent years on the unfertilized land, whereas there has been a slight increase in yield on similar land when the same crops have been grown in rotation with each other and with clover. A given quantity of manure or fertilizer, moreover, has produced a smaller increase on crops grown continuously than on those grown in rotation.

"In the 5-year rotation of corn, oats, wheat, clover, and timothy the unfertilized yield of corn has remained practically stationary throughout the 15 years of the test; that of oats has been slightly larger during the last five years than previously, and that of wheat decidedly larger, this gain in wheat yield being due chiefly to greater immunity to insect attack during the latter period. The average increase per acre in all the cereal crops has been very much greater during the latter period than formerly, due to the cumulative effect on the fertilizers and manure.

"As between chemical fertilizers and open-yard manure, the manure has shown the greater increase in effectiveness during the later years of the test.

"On both the thin land on which this 5-year test is located and on the richer soil used in the 3-year rotation of potatoes, wheat, and clover the greatest total yield and the greatest net gain after deducting the cost of the fertilizer, have been produced by complete fertilizers, carrying nitrogen in nitrate of soda, phosphorus in acid phosphate, and potassium in muriate of potash. The experiments, however, demonstrate the practicability of replacing the nitrogen and potassium with stable manure, thus greatly diminishing the cost of fertilizing and increasing the net gain.

"The experiments with manure forcibly demonstrate the importance of avoiding the waste to which manure is subjected while lying in open barnyards and of reenforcing manure with some carrier of phosphorus, to replace the phos-

phorus carried away in the bones of live stock, in milk, and in the grains which are sold off the farm."

An investigation of the causes of variation in soil fertility as affected by long continued use of different fertilizers, B. E. Brown and J. J. Skinner (*Pennsylvania Sta. Rpt. 1908, pp. 26–68, pls. 3*).—This article gives the results of investigations undertaken in 1907 to determine if possible the causes of variation in yield of plats of residual limestone soil which have been used for the past 25 years in fertilizer experiments on a 4-year rotation consisting of corn, oats, wheat, and clover and timothy. The fertilizer experiments had shown that the soil responds best to applications of phosphoric acid.

Extraction of the soil of the different plats with 1 per cent citric acid gave results showing some agreement between the amounts of phosphoric acid dissolved and the yields obtained. There were no decided differences in the amounts of lime, magnesia, phosphoric acid, and potash extracted by hydrochloric acid of 1.115 sp. gr. Plats giving the highest yields were uniformly low in water-soluble nitrogen as compared with plats giving lower yields. Total nitrogen in general harmonized with the yields. Plats which had received muriate of potash alone or in combination were in greater need of lime than plats not so treated.

"Soil extract studies were carried on, using wheat seedlings as an indicator of soil conditions. High-yielding plats, during season wheat was on the ground, gave comparatively poor extracts. Low-yielding plats, however, gave good extracts during the same period.

"After harvesting the wheat these plats approached much nearer the order that obtained in the field. The results may be ascribed to products of plant growth."

A study of certain mutual properties of two adjoining fields which gave widely varying yields, B. E. Brown (*Pennsylvania Sta. Rpt. 1908, pp. 102–104*).—A chemical study of the soils of two adjoining fields, the soils of which were of the same origin but varied widely in productiveness as a result of difference in treatment, showed that the less productive soil was uniformly poorer in fertilizing constituents, less retentive of moisture, and more in need of liming than the productive soil.

Physical and chemical study of the Milton Grove soils, W. Frear (*Pennsylvania Sta. Rpt. 1908, pp. 171–174, fig. 1*).—Determinations of hygroscopic moisture, carbon dioxid, organic carbon, loss on ignition, chlorin, and nitrogen in soils used in experiments in growing tobacco under shelter are reported and discussed.

Report on Wisconsin soil resources and need of a soil survey, S. Weidman and A. R. Whitson (*Rpt. Conserv. Com. Wis., 1 (1909), pp. 37–53, fig. 1*).—Data from the State census reports for 1885, 1895, and 1905 are reported which show that there has been a healthy and reasonable increase in the percentage of improved farm lands in Wisconsin since 1885. It is shown that 32.3 per cent of the total area of the State is improved farm land, and it is estimated that from 70 to 75 per cent of the total area may be ultimately brought under cultivation. The soil resources of the southern half of the State are much better utilized than those of the thinly settled northern half. It is believed that conservation and development of soil resources of the State depend upon a systematic survey of the soils.

"Since this work is largely to be used as the foundation of much of the work of the agricultural experiment station, it is important that the work be done through the cooperation of the geological and soil survey with the agricultural college. The soil survey should be carried on simultaneously in the northern and southern parts of the State."

A preliminary report on the phosphates of Wisconsin soils, A. R. WHITSON (*Rpt. Conserv. Com. Wis., 1 (1909), pp. 54–63*).—This article discusses the distribution of phosphoric acid in different types of Wisconsin soils as well as the influence of continuous grain growing and special crop (tobacco) farming on the phosphorus content of soils.

It is very clearly shown that in a comparatively short time many of the soils will be depleted of their phosphoric acid. Where clay loam soils are cultivated continuously to grain relatively little phosphoric acid is lost from the soil except that removed by the crop, but even in this way a considerable proportion of the phosphoric acid will be lost in one or two generations.

It was found that while continuous tobacco growing removes large amounts of nitrogen and potash and relatively small amounts of phosphoric acid, there is no accumulation of phosphoric acid in the surface 8 in. of soil. Continuous cropping without manure for a considerable number of years tends to produce acid soils, a condition which indicates a deficiency in available phosphate. Attention is also called to the considerable losses of phosphorus occurring in manures in storage and resulting from hillside erosion.

The conservation of phosphates on Wisconsin farms, A. R. WHITSON and C. W. STODDART (*Wisconsin Sta. Bul. 174, pp. 3–20, figs. 5*).—This bulletin points out the fact that the importance of phosphates to the agriculture of Wisconsin has not been sufficiently recognized by farmers; gives data showing the amount of phosphates removed from farms in grain, milk, cheese, and live stock sold and in the manure which is allowed to go to waste; and reports experiments on old exhausted soils of different kinds which showed that the application of 300 lbs. per acre of acid phosphate as a rule greatly increased the yield.

Experiments are also reported to show that even new lands are often deficient in available phosphate. Acidity is usually an indication of the need of phosphatic fertilizers. Rock phosphate supplementing manure was found to increase yields to a marked degree.

It is pointed out that there are two methods of maintaining the supply of phosphates in the soil, namely, "the purchase of feeding stuffs containing phosphates and the purchase of phosphate fertilizers. By buying bran for feeding purposes phosphates may be maintained on dairy farms. By the purchase of fertilizers the phosphates of the soil may be absolutely maintained. The most important phosphate fertilizers for Wisconsin farms are ground steamed bone meal, raw rock phosphate, and acid phosphate, all of which can be obtained at moderate cost."

Soil survey work in South Carolina (*Ann. Rpt. Comr. Agr., Com. and Immig. S. C., 5 (1908), pp. 132–141*).—This is a summary of the work done by the Bureau of Soils of this Department in this State, including 11 soil surveys aggregating up to June 30, 1908, 6,343 sq. miles or 4,059,520 acres.

Soils (*Dept. Agr. Trinidad, Bul. Agr. Inform., 1909, n. ser., No. 61, pp. 27–32*).—This article gives the results of examinations of a rich peaty lagoon soil and of a soil on which sugar cane was badly diseased with blight, as well as a short treatise on the drainage of soils. The lagoon soil was found to be especially rich in phosphoric acid (0.117 per cent in surface soil and 0.164 in subsoil), organic matter, and nitrogen (1.31 per cent in surface soil and 1.34 in subsoil). The soil on which cane blight prevailed was found to contain more magnesia (0.52 per cent) than lime (0.34 per cent).

The genesis of loess a problem in plant ecology, B. SHIMEK (*Proc. Iowa Acad. Sci., 15 (1908), pp. 57–64*).—"It is the purpose of this paper to briefly set forth a preliminary statement of the relation of plants to the formation of loess, and to call attention to the fact that the investigation of the problem of the genesis of loess lies within the province of the plant ecologist, for the study

of plant relations throws light on several important phases of the subject, and incidentally strengthens the eolian hypothesis."

The influence of geology on horticulture, C. H. Hooper (*Jour. Roy. Hort. Soc. [London], 34 (1909), No. 3, pp. 394–410, pl. 1, figs. 4*).—This article discusses the relation of surface geology and the character of the soil to the growth of different plants, more particularly fruit-producing plants, in different parts of the British Isles. Rather definite relations of this kind are traced.

Bibliography of North American geology for 1906 and 1907, with subject index, F. B. Weeks and J. M. Nickles (*U. S. Geol. Survey Bul. 372, pp. 317*).—A bibliography of soils is included.

The waste from soil erosion in the South, W. W. Ashe (*Amer. Rev. of Reviews, 39 (1909), No. 4, pp. 439–443, figs. 3*).—Attention is called to the large loss from this source. It is stated that more than 5,000,000 acres of land in the upland regions of the South which were once cultivated are now idle mainly as a result of soil exhaustion and erosion. Clean culture and removal of forest growth tend to increase floods and consequent erosion. Terracing and reforesting are referred to as means of reducing the injurious effects of the erosion. Considerable areas of exhausted and washed lands have been partly reclaimed by natural reforesting. In the author's opinion "it would be possible to reduce the present erosion from farm lands one-half with an enormous saving to the nation."

The conservation of soil moisture, W. MacDonald (*Agr. Gaz. N. S. Wales, 20 (1909), No. 4, pp. 333–339*).—This is a summary of conditions essential to the conservation of moisture in dry land farming.

The water requirements of crops with special reference to tropical conditions, P. Vageler (*Tropenpflanzer, 13 (1909), Nos. 3, pp. 103–113; 4, pp. 160–174*).—A rather complete discussion of this subject.

The chemistry of heated and of partially sterilized soils, S. V. Pickering (*Gard. Chron., 3. ser., 45 (1909), No. 1166, p. 275*).—This is a brief summary of recent progress in investigations on this subject.

Comparative soil temperature study of two plats differently treated, B. E. Brown (*Pennsylvania Sta. Rpt. 1908, pp. 93–102, pls. 3, fig. 1*).—Observations by means of recording thermographs on the temperature variations on a very productive and a less productive plat which had been used in long continued fertilizer experiments are reported.

"During the period wheat was on the ground, in 1907, the low yielding plat recorded the higher temperature. During the winter 1907–8 the high yielding plat maintained the higher temperature. Again in 1908, with clover and timothy growing the low-yielding plat recorded the higher temperature. Moisture determinations were made on the two plats. [The] plat producing greater crops, usually ran higher in moisture. Greater amounts of water-soluble nitrogen and potassium were recovered from the plat recording the higher temperature during the growing season. The amounts of calcium and phosphorus recoverable were about the same from each plat. The plat recording the higher temperature during the growing season produces lower yields."

Investigations on the action of sulphurous acid on soils, E. Haselhoff (*Internat. Phytopath. Dienst (Beigabe Ztschr. Pflanzenkrank.), 1 (1908), No. 3, pp. 73–91, pls. 2*).—In connection with a study of the injurious effect of smoke and fumes, pot experiments were made with beans and barley to determine the action of sulphurous acid when used at the rate of 14.96 gm. to each 8 kg. of soil, the acid being drawn through the soil in varying amounts at intervals during the growth of the plants. Experiments were made with soils free from copper and with those containing various copper salts supplying 0.25 to 0.5 per cent of copper oxid.

It was observed that the action of the sulphurous acid depended very largely upon the amount and character of the soil bases. When the soil was given an acid reaction as a result of the addition of the sulphurous acid the growth of the plants was retarded, but when the soil contained a sufficient amount of bases to neutralize it no injurious effect was observed. A high content of calcium carbonate reduced the solvent power of the sulphurous acid on copper compounds and thus diminished the injurious effect resulting from this cause.

Contribution to the knowledge of humus compounds, R. Miklauz (*Ztschr. Moorkultur u. Torfverwert., 4 (1908), pp. 285–327; abs. in Ztschr. Angew. Chem., 22 (1909), No. 16, pp. 739, 740; Chem. Zentbl., 1909, I, No. 11, pp. 937, 938*).—The results of a study of the action of acids and alkali solutions on peat and dopplerite and of the products of solution are reported.

The catalase of soils, D. W. May and P. L. Gile (*Porto Rico Sta. Circ. 9, pp. 3–13*).—The occurrence of catalase in various vegetable substances and in soils was investigated by Loew and May several years ago (E. S. R., 13, p. 115). Investigations by König et al. (E. S. R., 17, p. 1138) indicate that the evolution of oxygen on treating soils with hydrogen peroxid is due to catalase produced by soil bacteria. Pursuing this line of investigation further the authors conclude that "the power of a soil for decomposing hydrogen peroxid depends upon the catalase content, enhanced in special cases only by the colloidal action of the mineral constituents.

"This property is not a measure simply of the bacterial content, but is a rough measure of the combined quantity of bacteria and organic matter present in the soil.

"The most accurate method of comparing different quantities of catalase is on the basis of the time required to evolve a certain volume of oxygen from a certain quantity and concentration of peroxid.

"The speed of the reaction between catalase and hydrogen peroxid is dependent upon: (1) The amount of catalase present; (2) the concentration of the peroxid used; (3) the amount of peroxid used; (4) the acidity or alkalinity of the solution in which the reaction takes place; (5) the temperature at which the reaction takes place; and (6) the frequency with which the flask containing the catalase and peroxid is agitated.

"In the method adopted the catalase contents were compared on the basis of the number of minutes required by 5 gm. of soil to evolve 100 cc. of oxygen from 60 cc. of neutral 0.92 per cent peroxid, the flask being shaken continually during the reaction.

"Exposure to a high temperature for a short time had less effect in destroying catalase in soils than the action of a lower temperature for a longer time.

"Carbon bisulphid inhibits materially the catalytic action.

"Treatment of soil with manures was without effect on the activity or amount of catalase."

Increasing the soil's nitrogen content (*Sci. Amer. Sup., 67 (1909), No. 1740, pp. 296, 297, figs. 8*).—This is a brief account of investigations by Bottomley on seed and soil inoculation for leguminous and nonleguminous crops.

Inoculation with nodule-forming bacteria, W. S. Sayer (*Michigan Sta. Circ. 5, pp. 4, figs. 3*).—This circular explains briefly the value, need, and method of inoculation with nodule-forming bacteria.

General fertilizer experiments, T. F. Hunt (*Pennsylvania Sta. Rpt. 1908, pp. 68–93, pls. 8*).—This is substantially a reprint of Bulletin 90 of the station (E. S. R., 20, p. 1017), but giving more detailed data. See also a previous note (E. S. R., 15, p. 143).

Action of fertilizers on woody plants, Chancerel (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 3, pp. 235–241*).—Experiments in water cultures and

artificial and natural soils with various fertilizer combinations on seedlings of various forest trees are reported. Potash fertilizers checked growth, and lime fertilizers, slag, and phosphatic fertilizers generally hastened it.

Experiments on the action of lime nitrogen, GERLACH (*Deut. Landw. Presse, 36 (1909), No. 33, pp. 353–355*).—The results of comparisons of lime nitrogen with nitrate of soda on oats, barley, rye, potatoes, and beets in a large number of field experiments are summarized in this article. The results in general show that the nitrogen of lime nitrogen is the less effective. Taking the action of nitrate of soda as 100, that of lime nitrogen on medium fertile soil as 94, on sandy soil 60, and on heavy loam soil 52. In central Germany the cost of nitrogen in lime nitrogen is to that of nitrogen in nitrate of soda as 70 : 100.

The effect of lime nitrogen containing a high percentage of calcium carbid on plant growth, H. VON FEILITZEN (*Deut. Landw. Presse, 36 (1909), No. 30, p. 327*).—In comparative tests with winter rye of nitrate of soda and samples of lime nitrogen containing high percentages (5.5) and low percentages (0.1) of carbid, it was found that nitrate of soda applied at the rate of 300 kg. per hectare (about 267 lbs. per acre) retarded but did not prevent germination when the seed was planted immediately after the application of the fertilizer. Germination was more seriously interfered with and to a considerable extent prevented when application of lime nitrogen immediately preceded seeding. The injurious effect in this case was greater the higher the percentage of calcium carbid. When the lime nitrogen was applied 14 days before seeding no injurious effect was observed.

Acetylene gas refuse as a manure (*Gard. Chron., 3. ser., 45 (1909), No. 1165, p. 264*).—In pot experiments carried out by W. B. Burgess, of the Wye Agricultural College, it was found that the growth of plants (mustard) was inversely proportional to the amount of carbid present. Even 1 per cent had an injurious effect, while 20 per cent completely prohibited growth.

The actual state of production of synthetic nitrogenous fertilizers, G. RAGONDET (*Ann. Gembloux, 19 (1909), No. 5, pp. 310–326*).—This is a review of the present status of the manufacture of nitrogen compounds from the nitrogen of the air.

The utilization of atmospheric nitrogen, F. EMICH (*Mitt. Naturw. Ver. Steiermark, 44 (1907), No. 2, pp. 219–224*).—This article discusses briefly the fixation of nitrogen by means of electric discharges and calcium carbid, and the possibilities of these means of securing supplies of nitrogen compounds for commercial purposes.

Employing the atmosphere in the service of agriculture, R. RIECKE (*Saaten-, Dünger u. Futtermarkt, 1909, No. 15, pp. 406–408, figs. 6*).—This is a brief account of the commercial application of the Frank and Caro process for the manufacture of calcium cyanamid.

The industrial manufacture of calcium cyanamid, H. MARCHAND (*Rev. Gen. Sci., 19 (1908), No. 24, pp. 982–986; abs. in Chem. Abs., 3 (1909), No. 10, p. 1121*).—This is a description of the Frank and Caro process.

Nitric acid and other spark reactions, P. ASKENASY (*Jahrb. Elektrochem., 12 (1905), pt. 2, pp. 692–701*).—The progress in electrochemical processes during 1905 is briefly reviewed.

Nitrogen compounds of carbid, P. ASKENASY (*Jahrb. Elektrochem., 12 (1905), pt. 2, pp. 729–734*).—The progress in the development of processes for this purpose during the year 1905 is reviewed.

The present state of the production of nitrate in Norway, L. DE LA VALLÉE POUSSIN (*Rev. Gén. Chim., 12 (1909), No. 1, pp. 1–18, figs. 19; abs. in Chem. Abs., 3 (1909), No. 10, p. 1121*).—The process, products, establishments, and output are discussed.

The consumption of nitrate of soda in the United States, C. E. MUNROE (*Jour. Indus. and Engin. Chem., 1 (1909), No. 5, pp. 297–299*).—This article gives data regarding the total consumption and principal uses of fertilizing materials in 1905, based upon census figures compiled in that year (E. S. R., 20, p. 825). The total consumption of nitrate of soda in the United States in that year is given as 254,772 short tons. Of this amount, 42,213 tons was used for fertilizing purposes as compared with 19,518 tons in 1900.

Contribution to the study of phosphates, of their isomerism, and of the transformations which they undergo in the soil, A. QUARTAROLI (*Staz. Sper. Agr. Ital., 42 (1909), No. 1–2, pp. 121–160*).—From chemical studies and experiments the author concludes that there can be two forms of dibasic phosphates, one transformable by the addition of strong acids into monobastic phosphate and the other not so transformable; and two forms of tribasic phosphate, one transformable into dibasic phosphate and the other not. In the form of tribasic phosphate not transformable into dibasic, there is no hydrolytic decomposition.

The author considers that the usual opinion that in the soil monocalcium phosphate passes for the most part into an insoluble form as dicalcium or tricalcium phosphate is erroneous. When monocalcium phosphate is diffused in the soil, by the action of water, it is decomposed, forming a more or less concentrated solution of monocalcium phosphate. This begins to change, giving crystallized dicalcium phosphate, while the phosphoric acid set free unites with the calcium carbonate in the soil, or, eventually, even with the compounds of iron and aluminum. When this process has gone on till the solution of monocalcium phosphate is sufficiently diluted, no further change takes place.

When dicalcium phosphate is used as a fertilizer the distinction between the two forms is no longer made. These two forms the author calls symmetric and asymmetric, the latter being the amorphous and the former the crystallized form.

Carriers of phosphorus in fertilizers, C. E. THORNE (*Ohio Sta. Circ. 93, pp. 8*).—This circular briefly describes different sources of phosphoric acid and gives the results of experiments extending over about 20 years at different places in Ohio on the effect of dissolved boneblack, acid phosphate, basic slag, and bone meal on a 5-year cereal rotation of corn, oats, wheat, clover, and timothy, and a 3-year rotation of potatoes, wheat, and clover.

The results of the 20 years' experiments seem clearly to indicate that acid phosphate is the most effective of the carriers of phosphorus used in these experiments for cereal crops, but that bone meal and basic slag are preferable for clover on acid soils.

"When, however, the matter is considered from the standpoint of a complete rotation, embracing both cereal crops and clover, it appears that on these acid soils the utmost that can be claimed for basic slag is that its total phosphorus has been of equal effect with the available phosphorus in acid phosphate, or the phosphorus in fine bone meal, pound for pound, and that no additional value can be ascribed to the basic slag because of the lime or other substances which it may have contained; while on soils that have been limed the pound of total phosphorus in basic slag has been less effective than the pound of available phosphorus in acid phosphate or in fine bone meal."

The different phosphates were used in combination with other essential fertilizing constituents, the nitrogen in all cases being supplied in the form of nitrate of soda. It is suggested that possibly the basic slag would have been relatively more effective on acid soils if it had not been used in connection with nitrate of soda. In any case, the indications are that the use of the slag to correct soil acidity would be an expensive method as compared with the use of quicklime.

"There is reason to believe that acid phosphate increases the tendency to soil acidity, but it is not the sole cause of such acidity, for there are very acid soils which have never received any acid phosphate."

Is the phosphoric acid of floats made soluble by rotting manure? M. S. McDowell (*Pennsylvania Sta. Rpt. 1908, pp. 175–178*).—Six lbs. of raw Tennessee phosphate was mixed with 228 lbs. of mixed manure and the mixture was buried in a tight barrel in a manure heap from July, 1907, to August 21, 1908. An examination of the thoroughly fermented material thus obtained showed no increase in either water-soluble or citrate-soluble phosphoric acid as a result of the treatment.

Decomposition of soil-producing rocks, E. Haselhoff (*Landw. Vers. Stat., 70 (1909), No. 1–2, pp. 53–143; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 557, II, p. 259; Chem. Abs., 3 (1909), No. 13, p. 1566*).—In pot experiments with freshly broken unweathered rock it was found that grasses and legumes were able to extract plant food and to make more or less growth, the legumes thriving better than the grasses. This is ascribed to the fact that legumes have the more extensive root system and are able to assimilate free nitrogen of the air. Different plants vary widely in their capacity to assimilate the plant food in unweathered rock. The addition of nitrogenous fertilizers increased both the yield and the nitrogen content of the plants, the benefit being especially marked in case of nonleguminous plants. No definite relation was found to exist between the material assimilated by the plants and that dissolved by various chemical reagents or by steam. The action of moisture and frost during the winter was without influence on the solubility of the rock constituents.

The value of potassic rocks as fertilizer, F. Schäcke (*Kuxen Ztg., 12 (1908), No. 275; abs. in Ztschr. Angew. Chem., 22 (1909), No. 16, p. 740*).—Good results with ground phonolith on various crops are reported.

The value of potassic rocks as fertilizer, P. Krische (*Kuxen Ztg., 12 (1908), No. 281; abs. in Ztschr. Angew. Chem., 22 (1909), No. 16, p. 740*).—Schäcke's conclusions, noted above, are thought to be based upon insufficient data.

Artificial kainit (*Agr. Gaz. N. S. Wales, 20 (1909), No. 4, pp. 340, 341*).—Attention is called to a carbonate of potash prepared from kelp which is sold under the name of kainit and which may cause considerable loss of ammonia when mixed with sulphate of ammonia or other nitrogenous fertilizers.

The Stassfurt potash salts, B. L. Emslie (*Jour. Soc. Chem. Indus., 28 (1909), No. 8, pp. 393–398*).—This is a summary of information regarding the geology, composition, methods of mining and refining, and industrial applications of these potash salts.

Tertiary potash deposits in Upper Alsace, F. Meinecke (*Naturw. Wchnschr., 24 (1909), No. 17, pp. 268, 269*).—Extensive deposits are described.

The production of potash salts in Germany in 1908, Maizières (*Engrais, 24 (1909), No. 18, pp. 489, 490*).—The production in 1908 is compared with that of previous years, extending back to 1861. The total production in 1908 is given as 6,090,439 metric tons.

Loss of potash in commercial fertilizers, F. B. Porter and E. G. Kenny (*Jour. Indus. and Engin. Chem., 1 (1909), No. 5, pp. 304–307*).—A study of the conditions affecting the retention of soluble potash in mixed fertilizers and of the liberation of the retained potash is reported.

The retention of potash is usually ascribed to the influence of acid phosphates in the fertilizer mixtures. It was found that acid phosphates of different ages and from different kinds of rock showed practically the same retentive power. The amount retained increased with the percentages of potash and

acid phosphate present. Even acid-free dried phosphate retained a certain amount of potash. The higher the concentration of potash the more rapid the retention. It was also found that ground phosphate rock retained more or less potash and that a part of the loss of potash observed in ordinary fertilizer analysis occurs in the precipitate produced by ammonia and ammonia oxalate. Tankage either showed practically no tendency to retain potash or in some cases partially prevented the retention of potash. The retention of potash was found to reach its maximum in stored goods.

The author believes that these results "bear out the supposition previously held that the retention of potash is not due in any marked degree to the formation of a chemical compound, but is nothing more nor less than happens to a larger percentage of the potash when it comes in contact with the soil, as shown by the work of Schreiner and Failyer" (E. S. R., 17, p. 1139).

Sodium as a partial substitute for potassium, B. L. Hartwell and F. R. Pember (*Rhode Island Sta. Rpt. 1908, pp. 243–285, pl. 1*).—In continuation of the previous year's work with wheat (E. S. R., 20, p. 124), the water-culture experiments were extended to include barley, oats, rye, and millet. The results of both years' experiments are summarized in this article.

"Experiments with millet, oats, barley, and rye seedlings showed, as with wheat, that sodium was beneficial when used with a deficient amount of potassium. Its effect with rye, however, was less than with the other cereals, direct comparisons having been made with wheat and with barley seedlings. . . .

"Increasing the amount of sodium to two and three times that which was equivalent to the partially replaced potassium, the amount ordinarily used, did not greatly change the extent of gain when compared with the growth resulting from the deficient amount of potassium alone.

"During a given time less potassium was absorbed by the seedlings when the potassium was supplemented by sodium than when it was not. In other words, sodium was a conserver of potassium. . . .

"The experimental work seems to show that the beneficial effect of sodium was not attributable to the increase of osmotic pressure, to a change of the acidity or alkalinity of the nutrient solution, nor to overcoming the effect of unfavorable quantitative relations of the nutrients in solution; although without doubt sodium salts under certain circumstances act advantageously in these ways.

"Apparently certain of the uses of potassium with some plants at least, may be performed by sodium; although there are certain principal functions of potassium which can not be performed by any other element. If the amount of potassium is insufficient for the performance of these exclusive functions, probably maximum growth can not be secured with any amount of sodium which may be added."

Lime as a fertilizer, R. W. Thatcher (*Washington Sta. Bul. 88, pp. 3–7*).—A brief statement is given of the beneficial effects of lime on soils and of the forms of lime which may be used as a fertilizer.

The decomposition of dolomite, N. Knight (*Proc. Iowa Acad. Sci., 15 (1908), pp. 107, 108*).—Analyses of more or less disintegrated dolomite showed that about 10 per cent of the calcium carbonate had been removed and that the magnesium carbonate had remained relatively stable. The layer immediately above the disintegrated dolomite was a ferruginous clay which had probably resulted from the dolomite by slow solution of the calcium and magnesium carbonates.

On sodium chlorid (cooking salt) as a fertilizer for sugar beets, F. Strohmer, H. Briem, and O. Fallada (*Österr. Ungar. Ztschr. Zuckerindus. u.*

Landw., 37 (1908), pp. 763–774; abs. in Chem. Zentbl., 1909, I, No. 9, p. 785).—On rich soils salt increased both the yield and the sugar content of the beets and no injurious effect was observed.

Fertilizing with liquid manure, C. ORTMANN (*Deut. Landw. Presse, 36 (1909), No. 29, pp. 320–322*).—The experience of various investigators with this fertilizing material is summarized.

Sabak, G. LOUCHEUX (*Nature [Paris], 36 (1908), No. 1841, Sup., p. 109; abs. in Chem. Ztg., 33 (1909), No. 35, Repert., p. 167*).—This material, which consists mainly of refuse from abandoned village sites, is described. A number of analyses are reported which show on the average 1.3 per cent of potash, 3.12 per cent of lime, 0.86 per cent of phosphoric acid, and 0.54 per cent of total nitrogen, of which 0.22 per cent is nitric nitrogen and 0.32 per cent organic nitrogen.

The manurial earth of the Kistna Delta, W. H. HARRISON (*Agr. Jour. India, 4 (1909), No. 1, pp. 56–61*).—The material referred to is soil obtained from yards of houses or from sites formerly occupied by houses or cattle sheds. An average sample was found to contain lime 2.6 per cent, potash 1.39 per cent, phosphoric acid 0.69 per cent, and nitrogen 0.09 per cent. At the rate at which this material is ordinarily used it supplies about 13 lbs. of nitrogen, 194 lbs. of potash, and 96 lbs. of phosphoric acid per acre annually and as so used is an effective fertilizer, but it is becoming scarce and expensive.

The valuation of peat litter on the basis of its water capacity, L. WILK (*Ztschr. Moorkultur u. Torfverwert., 4 (1908), pp. 328–349; abs. in Ztschr. Angew. Chem., 22 (1909), No. 16, p. 740; Chem. Zentbl., 1909, I, No. 11, p. 938; Chem. Ztg., 33 (1909), No. 37, Repert., p. 173*).—This is a plea for reliable methods of determining the absorptive capacity of peat litter for water and thus furnishing a basis for the commercial valuation of such material.

The fertilizer industry, F. B. CARPENTER (*Amer. Fert., 30 (1909), No. 4, pp. 5–9, fig. 1*).—This is a brief historical sketch of the development of this industry with some reference to present theories regarding soil fertility. Incidentally it is shown that the first legislation in this country providing for the inspection of fertilizers was enacted in Massachusetts in 1873.

The use of commercial fertilizers, C. G. HOPKINS (*Illinois Sta. Circ. 129, pp. 24, fig. 1*).—This is an address read before the Illinois State farmers' institute at Rockford in February, 1909, and contains a discussion of this subject, particularly from the standpoint of the grain grower of the Middle West.

The fertilizer question in China, P. KRISCHE (*Ernähr. Pflanzen, 5 (1909), p. 17; abs. in Ztschr. Angew. Chem., 22 (1909), No. 15, p. 687*).—Commercial fertilizers are to some extent replacing the fecal matter heretofore generally used.

The wholesale trade in commercial fertilizers (*Chem. Ztschr., 8 (1909), No. 8, pp. 86–88*).—This is a review of the present status of the fertilizer market with special reference to German trade.

[Trade in commercial fertilizers] (*Hamburgs Handel, 1908, pp. 111–117*).—Statistics of trade in nitrate of soda, bone meal, bone ash, guano, phosphate, and sulphate of ammonia are summarized.

The failure of fertilizers used in Germany to come up to guaranty, ASMIS (*Illus. Landw. Ztg., 29 (1909), Nos. 4, pp. 23, 24; 6, pp. 43, 44*).—The extent of loss from this source by failure of purchasers to insist upon compliance with guaranty is pointed out.

Commercial fertilizers, M. A. SCOVELL, H. E. CURTIS, and G. ROBERTS (*Kentucky Sta. Buls. 136, pp. 343–427; 138, pp. 453–486*).—Results of examinations of 406 brands of fertilizers registered during 1908 are reported.

Analyses of fertilizers—spring season, 1909, B. W. Kilgore et al. (*Bul. N. C. Dept. Agr., 30 (1909), No. 4, pp. 55*). The results of inspection of fertilizers during the spring of 1909 are given in this bulletin.

Commercial fertilizers, J. L. Hills, C. H. Jones, and H. L. Miner (*Vermont Sta. Bul. 140, pp. 39–69*).—This bulletin is the first report on inspection of fertilizers during the season of 1909 and contains analyses and valuations of 56 brands.

The bulletins of the fertilizer control, J. L. Hills (*Vermont Sta. Circ. 1, pp. 4*).—This circular gives an outline of special articles which have been made a feature of the fertilizer bulletins of the station since 1902.

AGRICULTURAL BOTANY.

Catalogue of the grasses of Cuba, A. S. Hitchcock (*U. S. Nat. Mus., Contrib. Nat. Herbarium, 12, pt. 6, pp. XI+183–258*).—This is the result of a critical study of Cuban grasses, based primarily upon the collections at the Cuban Experiment Station, and supplemented by the collections of the National Herbarium, Gray Herbarium, specimens in the Herbarium of the New York Botanical Garden, etc.

The power of growth exhibited by ostrich ferns, G. E. Stone (*Bul. Torrey Bot. Club, 36 (1909), No. 4, pp. 221–225, fig. 1*).—An account is given of the author's observations on a number of ostrich ferns growing about his house, some of which have pushed their rhizomes under a concrete walk 2½ to 3 in. thick, which has been ruptured almost annually by the appearance of the young fronds.

Some experiments were carried on to determine the force required for breaking the layer of cement, and the author finds that it equals 361 gm. to each square millimeter of cross-section surface of the frond, or about 35 atmospheres, a force considerably in excess of any hitherto reported showing the power of the growth of plants.

The water-storing tubers of plants, J. W. Harshberger (*Bul. Torrey Bot. Club, 35 (1908), pp. 271–276, pl. 1*).—A report is given of studies of the tubers occurring on *Nephrolepsis cordifolia* and related species and the decorative asparagus (*Asparagus sprengeri*). As a result of the author's investigations he has determined that the principal function of these tubers is for water storage.

The relation of fertility to the nourishment and morphology of plants, M. Wagner (*Landw. Vers. Stat., 69 (1908), Nos. 3–4, pp. 161–233*).—This investigation was conducted to determine the influence of different fertilizers and different times of application on the proportion of plant substance produced above and below ground during different stages of growth. Pot experiments were made with oats, barley, buckwheat, and mustard in 1904 and 1905. The composition of the soil used is given. The fertilizers consisted of combinations of phosphoric acid, potash, and nitrogen.

In 1905 the same plants were grown in pots but seeded earlier to secure complete ripening. A normal application of 1 gm. phosphoric acid, 1.5 gm. potash, and 1.5 gm. nitrogen was added to some of the pots, while in others double these quantities were used. The phosphoric acid was applied at the time of seeding. The potash was applied in the form of potassium silicate at the time of seeding and potassium sulphate and a 40 per cent potassium salt on April 22 for the oats, barley, and mustard, and on May 20 for the buckwheat. The ammonium nitrate was given one-half at the time of seeding and the remainder on April 22, with the exception of the buckwheat, upon which it was applied May 20. The different plants were harvested upon maturity, and the potash, phosphoric acid, and nitrogen content determined.

The soil used was exceptionally poor and the effect of each plant food was readily shown. Toward the maturity of the plants, the portions above ground as well as the roots lost in weight, the reduction being the largest where no nitrogen or fertilizer of any sort had been applied. Oats produced the greatest proportion of roots, followed by barley, mustard, and buckwheat in decreasing order. A lack of nitrogen in the soil induced a greater root growth than a lack of either potash or phosphoric acid. Without potash oats produced 62 per cent of the crop resulting from the use of a complete fertilizer.

The mineral nutrition of plants during germination, C. SCHREIBER (*Rev. Gén. Agron., n. scr., 4 (1909), No. 1, pp. 1–4*).—According to the author, many physiologists claim that young plants do not take up mineral matter until after the reserve material in the albumen and cotyledons has been used and the first permanent leaves have made their appearance. To determine this, he carried on a series of experiments with a large number of dicotyledonous and other plants the cotyledons of which are epigeous in germination.

The experiments with radish, colza, white mustard, and spurry are described at some length. It appears that plantlets whose cotyledons develop above ground after the germination of the seed are able to take up mineral matter from the soil before the reserve material of the grain is completely used and before the appearance of permanent leaves.

A study on the disassimilation of plants, N. T. DELEANO (*Arch. Sci. Biol. [St. Petersb.], 14 (1909), No. 1–2, pp. 159–172, dgms. 6*).—In a previous publication (E. S. R., 18, p. 923), the author in collaboration with others showed that the curve of assimilation and growth of plants ascended rapidly for a time, to be followed by a period of less active increase, and finally by a reduction in the mineral content of the plant largely due to diffusion. This last phase of the subject has been studied further with *Sterigmatocystis nigra*, comparisons being made with oats.

As with the oats, the maximum of dry and mineral matter was reached at about the time of fruiting, after which there was a gradual reduction corresponding with a cessation of protoplasmic development.

A study was also made of the soluble and insoluble nitrogen in the fungus after fruiting, and the author claims that these nitrogenous products result from the decomposition of the complex albuminoids immediately after fructification.

Studies on chlorophyll, M. TSVETT (*Biochem. Ztschr., 10 (1908), No. 4–6, pp. 404–429*).—A study was made of some of the chlorophyll derivatives, phæophytin, chlorophyllan, phylloxanthin, and crystallized chlorophylls, and a diagrammatic system is presented for the classification of the so-called chlorophyll derivatives.

The photodynamic work of chlorophyll and its relation to photosynthesis in plants, W. HAUSMANN (*Biochem. Ztschr., 16 (1909), No. 4–5, pp. 294–312*).—According to the author, alcoholic extracts of leaves have a photodynamic effect on the red corpuscles of the blood as well as upon Paramecium. The photodynamic work of plant extracts containing chlorophyll and of pure chlorophyll takes place in the same portions of the spectrum in which the highest assimilatory activity of the plants is shown. He states that it is probable that chlorophyll in plants acts as a sort of photodynamic substance which incites photosynthesis, and the present state of information seems to point to an intimate connection between photosynthesis and the photodynamic work of plants. Phylloporphyrin and hæmatoporphyrin have similar photodynamic activities. The close relationship between the coloring material of blood and chlorophyll is further shown by the similar photodynamic work of their derivatives.

The rôle of light in the formation of proteids in plants, W. ZALESKI (*Ber. Deut. Bot. Gesell., 27 (1909), No. 2, pp. 56–62*).—Experiments with a considerable number of plants in normal and colored light indicate that when there is an abundant supply of carbohydrates present light has little effect on the formation of protein in plants. With shoots of Windsor beans it had an indirect influence in that a greater amount of dry matter was produced by the plants in the light, and consequently an actual increase in the total nitrogen, although the relative proportions were but slightly changed.

On the transformation of starch in plants, W. BUTKEWITSCH (*Biochem. Ztschr., 10 (1908), No. 4–6, pp. 314–344*).—A study was made of the conversion of starch in the twigs of *Morus alba* and *Sophora japonica* cut early in the season.

The conversion of starch was found to be favored by temperatures of 60 to 70° C. but ceased at 80°. Toluol, chloroform, and low temperatures retarded starch conversion. An alcoholic precipitate was made from extracts of the different plants, which showed the presence of very active diastatic enzyms.

Biochemical researches on the development of anthocyanin in plants, R. COMBES (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 12, pp. 790–792*).—A study was made of the leaves of *Ampelopsis hederacea*, the red pigment of which is developed in intense light; the leaves of *Rosa canina*, *Mahonia aquifolium*, and *Sorbus latifolia*, which take on a red color under the influence of early frost in the autumn; and the leaves of *Spiræa paniculata*, which develop anthocyanin as a result of the ringing of the bark.

In the different individuals the sugars, glucosids, dextrins, and insoluble carbohydrates of both red and green leaves were determined, and it was found that an increase in the proportion of sugar and glucosids is concurrent with the development of anthocyanin and is also accompanied by a diminution in the quantity of dextrin. The insoluble carbohydrates behave in a somewhat different manner, depending on the conditions under which the reddening is formed. When the production of anthocyanin is due to intense light or annular decortication, the quantity of insoluble carbohydrates in the red leaves is much greater than in the green leaves.

In conclusion the author states that the development of anthocyanin in plants appears to be associated closely with the accumulation of sugar and glucosids and the diminution in the proportion of dextrin in the leaves.

The relative toxicity of ferrous sulphate to barley and rye seedlings, B. L. HARTWELL and F. R. PEMBER (*Rhode Island Sta. Rpt. 1908, pp. 286–294*).—The claim has been made that soluble ferrous salts in the soil are detrimental to plant growth, and as other investigations have shown wide differences in the effect of liming on the growth of barley and rye (E. S. R., 20, p. 126), the authors carried on a series of water-culture experiments with those plants to determine whether one kind of plant was more susceptible to injury by ferrous sulphate than the other.

Preliminary experiments were carried on with wheat seedlings which showed that the transpiration and weight of the green seedlings decreased with each successive increase in the amount of ferrous sulphate added to the solution. Similar experiments were then carried on with barley and rye seedlings, the relative transpiration and weight of the plants being determined.

So far as the experiments show, there appears to be no evidence to prove that the effect of ferrous sulphate is markedly different with barley and rye seedlings. In this respect there is a marked contrast to the effect of lime in the fields on these two cereals.

On the use of lime nitrogen and copper sulphate for the destruction of wild radish, L. HILTNER and F. LANG (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser.,*

7 (1909), No. 3, pp. 25–29).—An account is given of comparative experiments in which a 10 per cent solution of lime nitrogen, 2 and 4 per cent solutions of copper sulphate, and a 20 per cent solution of iron sulphate were compared.

The most efficient treatment, as shown by the reduction in the number of plants of wild radish and field mustard, was on the plats sprayed with the solution of iron sulphate, followed by the solutions of copper sulphate. The solution of lime nitrogen, however, considerably reduced the number of weeds on a given area, and when its fertilizing value is taken into consideration its employment as an herbicide has certain advantages.

Xenia in Solanacæ, E. Griffon (*Bul. Soc. Bot. France, 55 (1908), No. 9, pp. 714–720, pl. 1*).—Desiring to determine whether the phenomenon of xenia was exhibited in the hybrids of a number of species of solanaceous plants, the author conducted some breeding experiments with tomatoes, different varieties of eggplants, and common peppers. In all 9 hybrids and about 30 specimens were under observation. As a result of his study, the author claims that there was nothing that showed with certainty the existence of xenia in the fruits of these plants.

FIELD CROPS.

The Woburn field experiments, J. A. Voelcker (*Jour. Roy. Agr. Soc. England, 68 (1907), pp. 242–266; Separate, pp. 27*).—The year 1907 was the beginning of the fourth decade these experiments have been in progress. The manner of conducting the work has been previously described (E. S. R., 19, p. 226), but beginning with this year some modifications were made. Sulphate of ammonia was substituted for the mixture of equal parts of sulphate and muriate of ammonia. The quantities of nitrogen in the applications were reduced one-half, the double application equivalent in nitrogen to 50 lbs. of ammonia being retained in some cases for comparison. The mineral fertilizers were reduced to a general application of 3 cwt. of mineral superphosphate of lime and ½ cwt. of sulphate of potash per acre. Only one-fourth of the previous application of rape dust (14 cwt. per acre) is now used. The barnyard manure is now analyzed, and the actual quantity required to supply 100 lbs. of ammonia per acre is given. The treatment of 2 plats with rape dust and barnyard manure, respectively, was discontinued, 3 cwt. of superphosphate of lime and 1 cwt. of nitrate of soda per acre being used instead of the rape dust, and 1 cwt. each of sulphate of potash and nitrate of soda instead of the manure. The results secured on all plats are given in tables with brief discussions.

In the continuous wheat-growing tests lime given with sulphate of ammonia produced a marked beneficial effect. The best quality of wheat was secured on the rape-dust plats, the unmanured plats and those receiving only minerals standing next. Nitrate of soda gave wheat generally inferior in quality. The continuous barley-growing tests also showed the marked effect of lime in raising the yield when used in conjunction with sulphate of ammonia. The plat receiving 1 cwt. of nitrate of soda per acre produced 31 bu., 2 cwt. of nitrate of soda 36.4 bu., 1 cwt. of nitrate of soda with minerals 35.6 bu., and 2 cwt. with minerals 42.8 bu. per acre. The highest yield, 45.8 bu. per acre, was obtained on the plat receiving 100 lbs. of ammonia in barnyard manure. The best quality of barley, and the only product fit for malting in the series, was secured on the plat given per acre mineral fertilizers and 25 lbs. of ammonia as sulphate and treated in 1905 with 1 ton of lime.

A rotation experiment was conducted "to ascertain the difference of manurial value obtained by the consumption of, in the one case, decorticated cotton cake, and in the other, of maize meal, by sheep feeding off roots on the land [and], to ascertain what would be the difference of manurial value be-

tween these two foods when they were fed to bullocks in feeding-boxes and subsequently carted out to the field as farmyard manure and used for growing a root crop." This experiment was begun in 1904 and a general summary of results and conclusions is deferred until all rotations in the series have completed their course. The rotation practiced in connection with this work is as follows: Mustard as a green crop, swedes, barley, wheat.

As in the two previous years 1 cwt. each of nitrate of soda and of salt per acre gave a slightly better yield of mangels than either 1 cwt. or 2 cwt. of nitrate alone.

Apparently the best application per acre for alfalfa consisted of 4 cwt. each of superphosphate, bone dust and sulphate of potash, and 2 cwt. of nitrate of soda. The plat receiving this application yielded a trifle over 19 tons, 16 cwt. of green crop per acre. Canadian alfalfa seed gave much better results than either American of Provence seed.

In the improvement of old pasture on Broad Mead the use of 10 cwt. of basic slag and 1 cwt. of nitrate of potash per acre gave the best returns in 1905, and that of 10 cwt. of basic slag and 1 cwt. of sulphate of potash in 1907. The greatest amount of leguminous plants was found on the plats receiving per acre 5 cwt. of superphosphate and 1 cwt. of sulphate of potash and those receiving the basic slag and sulphate of potash.

On Long Mead in 1906 the plat treated with 5 cwt. of superphosphate and 4 cwt. of kainit per acre ranked first in yield of hay, but the increase was small. Lime used alone remained without apparent effect. In 1907 the highest yield was secured on the plat treated with 5 cwt. of mineral superphosphate and 1 cwt. of sulphate of potash per acre.

Thirty-first annual report of the seed control and experiment station at Zurich, F. G. STEBLER (*Landw. Jahrb. Schweiz, 23 (1909), No. 1, pp. 1–24, figs. 3*).—In 1908, 10,335 samples of seed were sent in which required 25,793 tests. The different points determined were degree of adulteration, purity, vitality, and cuscuta content. The average results secured from 1876 to 1908 with different varieties of clover, grasses, forage crops, leguminous plants, cereals, fiber crops, root crops, vegetable and forest seeds are tabulated. Brief notes on the seed of different kinds of plants examined during recent years are given.

Reports are also given on numerous culture tests with forage crops carried on throughout the country. Sainfoin seed from southern Russia did not give as good results as seed obtained from Arabia. Inoculated serradella gave a yield from three to four times as large as serradella grown without inoculation. The statement is made that the inoculating material now found upon the market is much more effective than formerly.

The Alpine experiment garden on the Sandling-Alp, T. VON WEINZIERL (*Pub. K. K. Samen-Kontroll Stat. Wien, No. 376, pp. 21, figs. 5, chart 1*).—A description is here given of this Alpine station and the different lines of work pursued are briefly outlined.

The composition of the herbage on permanent meadows under different treatment, E. LINDHARD (*Tidsskr. Landbr. Planteavl, 15 (1908), No. 4, pp. 467–503*).—Comparisons were made between 4, 3, and 2 cuttings during the season.

The largest amount of total dry matter was obtained when 2 cuttings were made with a relatively late first cutting, the dicotyledons being cut during the first half of the blossoming period and the grasses from half to full bloom. The quality of the crop was greatly dependent on the time and the number of cuttings. On May 20 the nitrogen content was 2.05 and 2.18 per cent for the 2

fields under test as against 0.95 and 1.06 per cent about July 1. Two cuttings produced more hay but less nitrogen than 4 cuttings.

Phosphoric acid and potash requirements of meadows, P. Liechti (*Landw. Jahrb. Schweiz, 23 (1909), No. 1, pp. 25–61*).—Cooperative fertilizer experiments including 579 individual tests were made in different parts of Switzerland, and the results secured by each experimenter are given in a table with brief comments. Phosphoric acid was applied at the rate of 80 kg. per hectare (about 71.2 lbs. per acre), potash at the rate of 120 kg. (about 106.8 lbs.), and lime at the rate of 500 kg. (about 445 lbs.). In this work potash and phosphoric acid were applied annually.

In 61.3 per cent of the tests phosphoric acid used alone gave an increase in yield, the highest increase being 2,480 kg. per hectare (about 2,200 lbs. per acre). Potash used alone gave an increase in 52.2 per cent of the experiments, and where the two substances were applied together an increase in yield resulted in 79.5 per cent of the tests. Lime in addition to phosphoric acid and potash did not seem very effective, an increase in yield having been secured in only two out of seven cases. The average increase due to the use of liquid manure applied alone, with superphosphate, and with superphosphate and lime amounted to about 22 per cent.

Methods of harvesting hay, N. P. Nielsen (*Tidsskr. Landbr. Planteavl, 15 (1908), No. 3, pp. 407–416*).—At the Tystofte Experiment Station vetch and oat hay was cured in cocks on the ground and on curing racks. The hay cured on the ground contained 19.58 per cent moisture in the samples analyzed, and that cured on the racks 20.45 per cent. Chemical analyses showed but small differences in composition in favor of rack curing. Hay of excellent quality was secured by both methods.

Alfalfa culture, C. G. Williams (*Ohio Sta. Circ. 91, pp. 8*).—The needs of the alfalfa plant are pointed out and directions for its culture in Ohio are given.

In a seeding test at the station a crop sown at the rate of 15 lbs. per acre produced 8,678 lbs. of hay per acre in 3 cuttings, but this was only 30 lbs. more than was produced by a crop sown at the rate of 10 lbs. of seed per acre. The yield of hay from 20 lbs. of seed per acre was 8,557 lbs., from 25 lbs. of seed 7,876 lbs., and from 5 lbs. of seed 7,862 lbs. of hay. These plats were seeded June 27, 1907, and a comparison of the stand July 31, 1907, and May 2, 1908, showed a shrinkage of 15.3 per cent where 5 lbs. of seed was used and of 30 per cent where 25 lbs. was used.

In 1907 a field of alfalfa sown June 27 and partly clipped September 9 and October 16 gave smaller yields on the clipped than on the unclipped portions.

In 1908 at the station red clover yielded 4.34 tons of hay per acre in 2 cuttings and alfalfa 4.66 tons in 3 cuttings. Analyses made by the station show that 100 lbs. of leaves contain as much protein as 240 lbs. of stems.

Variety and distance tests of corn, G. M. Macnider et al. (*Bul. N. C. Dept. Agr., 30 (1909), No. 2, pp. 5–37*).—Experiments have been conducted at Edgecombe Farm on Norfolk sandy and fine sandy loam, at Iredell Farm on Cecil clay and Cecil sandy loam, at Transylvania Farm on a dark heavy loam known as Toxaway loam, and at Buncombe Farm on Porter's loam. The results with varieties of corn are tabulated in detail, notes on the varieties grown in 1908 are given, and the principal early, medium, and late varieties as well as those best adapted to certain sections of the State are mentioned. Variety tests were conducted at the Transylvania Farm only in 1906 and at the Buncombe Farm only in 1908.

The following varieties have thus far given the highest average yields of shelled corn: At Edgecombe Farm Cocke Prolific, Weekley Improved, Sanders Improved, and Holt Strawberry; at Iredell Farm Weekley Improved, Sanders

Improved, Cocke Prolific, and Boone County White. The yields at Edgecombe Farm during the past 7 years in these comparative tests have ranged from 6.2 bu. to 26.6 bu. per acre. The average results for 7 years at Edgecombe Farm are in favor of planting the corn 4 ft. by 3 ft., while at Iredell Farm the average of 6 years' tests favors 5 ft. by 2 ft. planting.

Report upon variety and fertilizer experiments with cotton in the boll-weevil infested sections of Louisiana, W. NEWELL and A. H. ROSENFELD (*Crop Pest Com. La. Circ. 26, pp. 65–86*).—At Bayou Pierre 6 varieties were planted March 30 and April 1. On May 11 approximately 58 weevils per acre were found in the plats, and by May 28 the average number of over-wintered weevils had increased to 155 per acre. On June 13, 2 per cent of the squares on the plats were infested as compared with 3.5 to 12 per cent in fields near timber. On July 9 the average number of bolls per plant for the different varieties were as follows: Hawkins Early Prolific, 17.8 bolls per plant; Improved Peterkin, 15.8; Mebane Triumph, 12.4; Seago, 11.4; Keno, 10.9; and "native," 10.9. On this date an average of 11.33 per cent of the squares and 4.33 per cent of the bolls were infested on the plats. Of the varieties compared Keno led with 743 lbs. of seed cotton per acre at the first picking, August 19 to 29, followed by Hawkins Early Prolific with 702 lbs. These varieties gave a total yield of 1,031 and 911 lbs., respectively.

At Mansura 2 adult boll weevils were found while planting April 1. April 23, 23 weevils were found per acre; May 25, 109; and June 2, 283. June 2, 6 per cent of the squares were infested. July 18 the fruitage on the plats was as follows: Toole Early Prolific, 11.6 bolls per plant; Hawkins Early Prolific, 10.8; Rowden, 8.2; King, 8.1; Simpkins, 8.1; Triumph, 6.5; and "native," 6.5. On this date 54 per cent of the squares and 2 per cent of the bolls were infested. The first open boll was found in Toole Early Prolific. In total yield, as well as in yield at the first picking, Hawkins Early Prolific ranked first with 563 and 212 lbs. of seed cotton per acre, respectively. Toole Early Prolific ranked next in total yield and Mebane Triumph in earliness. The results of other variety tests are briefly reported.

In the fertilizer test on the rich alluvial soil at Bayou Pierre the results varied considerably, but nitrate of soda apparently increased the crop wherever used. At Mansura on dark, rather sandy loam, the nitrate was not so effective. The excessive weevil infestation prevented the utilization of the fertilizer applied.

The obstacles in the way of late planting to avoid weevil injury are pointed out and the results obtained in experiments along this line, which have been previously noted (E. S. R., 19, p. 31), are briefly summarized.

Variety and distance tests of cotton, G. M. MACNIDER ET AL. (*Bul. N. C. Dept. Agr., 30 (1909), No. 2, pp. 37–65*).—The results of variety tests with cotton are tabulated in detail, notes on the varieties tested in 1908 are given, and early, medium, and late varieties, and large-bolled varieties and those having a high percentage of lint are pointed out.

Russell Big Boll and Culpepper Improved have given the best average yields during 9 years at Edgecombe Farm, and King Improved, King Improved Native, and Edgeworth the highest average yields for 6 years at the Iredell Farm. During this time the differences in yields ranged from 530 to 915 lbs. of seed cotton per acre with the number of varieties ranging from 7 to 31, and from 455 to 565 lbs. of seed cotton per acre at the Iredell Farm with the varieties ranging from 9 to 30 in number. At Edgecombe Farm during the past 4 years the best average results were secured by planting cotton 3½ ft. by 16 in., and at the Iredell Farm during the past 6 years by planting 3½ ft. by 16 in.

Time and rate of sowing oats, A. J. HANSEN and N. THYSSEN (*Tidsskr. Landbr. Plantcavl, 15 (1908), No. 4, pp. 509–526*).—From the results of experiments conducted at four Danish experiment stations from 1896 to 1903 it is concluded that oats should be sown as early in April as weather conditions will permit and not later than May 1. Danish oats gave most satisfactory yields when sown at the rate of about 5 bu. per acre and gray oats at the rate of about 4 bu.

Manuring oats in the Western Province, A. K. HARDS (*Agr. Jour. Cape Good Hope, 34 (1909), No. 4, pp. 405–411, dgm. 1*).—Tabulated results of cooperative fertilizer tests show that all applications except the use of 10 tons per acre of kraal manure gave a profit this season. One hundred lbs. of nitrate of soda applied with 200 lbs. of basic slag or superphosphate per acre gave a good increase, but when either of these substances were used alone or in combination with 40 lbs. of sulphate of potash the increase in yield hardly paid for the application.

Manuring oats in the Longkloof, R. W. THORNTON (*Agr. Jour. Cape Good Hope, 34 (1909), No. 4, pp. 412–415, dgm. 1*).—In these experiments 100 lbs. of nitrate of soda per acre used alone or with 40 lbs. of sulphate of potash resulted in a loss. A profit was secured when it was applied with 200 lbs. of basic slag, but when used with 200 lbs. of superphosphate no increase in yield was obtained.

Seasonal report of potatoes, 1908 (*Ohio Sta. Circ. 90, pp. 7, charts 5*).—This circular embodies data based on notes taken at the station and on reports received from several hundred farmers representing every county in the State. At the station this season a high yielding strain of Carman No. 3, selected for 5 years, gave an increase in yield of about 41 per cent as compared with unselected stock. The results of other selection work indicates that if the highest yielding hills are selected without much regard to blight better yields will be secured than if blight resistance alone is considered.

[Report of] potato growers' field meeting (*Ohio Sta. Circ. 89, pp. 11–19, figs. 2*).—This is the report of a special potato growers' field meeting held in October, 1908, under the auspices of the Ohio State Horticultural Society, and includes reports of papers on Varieties of Potatoes by D. Egbert, and Potato Seed Selection and Improvement by F. H. Ballou.

Rape culture, T. REMY (*Fühling's Landw. Ztg., 58 (1909), No. 3, pp. 81–92*).—The results of variety tests of rape show that Dwarf rape led in yield of grain and Holland rape in yield of straw. Holstein and Canadian rape also gave good results. There was little difference in the oil content of the seed.

In culture tests the best results with the crop were secured when it was grown on black fallow. A table reporting the study of plant-food requirements of various crops in different months of the growing season shows that rape uses large quantities of nitrogen, phosphoric acid, and potash in the fall from September to November. The only crop resembling rape in this respect was ruta-baga.

The sugar content as a transmissible character in the sugar beet, K. ANDRLÍK, V. BARTOŠ, and J. URBAN (*Ztschr. Zuckerindus. Böhmen, 33 (1909), No. 6, pp. 345–357, figs. 7*).—The investigations described show that 100 individuals, each grown from three isolated mother beets high in sugar and belonging to strains of high transmission, had an average sugar content only 0.15 to 0.35 per cent smaller than that of their mothers, which ranged from 18.9 to 19 per cent. The largest number of the progeny carried from 18.5 to 19 per cent of sugar. In the case of 100 individuals from three rich mother beets fertilized by beets also rich in sugar, the average sugar content was 0.8 per cent lower with one mother beet and 0.06 per cent lower in another, while in

the third the sugar content of the mother and the average sugar content of the progeny were identical. The sugar content of the mother beets ranged from 19.9 to 20.2 per cent.

A hundred individuals each grown from three isolated beets low in sugar, but coming from strains high in sugar and high in transmissible power, contained on an average 1.36 per cent more sugar in one instance, 2.55 per cent more in another, and 1.2 per cent more in a third. In this observation the mothers contained 15.2 per cent, 15.4 per cent, and 16 per cent of sugar, respectively.

The polarization of beets in 1896 as compared with data secured in 1908 shows an important improvement in the quality of the mother beets, but the figures also point out that a reduction in variability has taken place. The data which are here discussed were furnished by growers of sugar beet seed and breeders of sugar beets.

The sugar content of the beet in its relation to seed production, V. Bartoš (*Ztschr. Zuckerindus. Böhmen, 33 (1909), No. 6, pp. 361–366*).—From the observations reported it is concluded that as the sugar content of beets is increased their seed production is diminished. Attention is called to the fact that this does not indicate that strains low in seed production are rich in sugar.

Experiment with nitrogenous fertilization, H. Agee (*La. Planter, 42 (1909), No. 11, pp. 170, 171*).—This paper, read before the Louisiana Sugar Planters' Association, March 11, 1909, summarizes the results secured with nitrogenous fertilizers in growing sugar cane. The nitrogen was applied in different forms, at the rate of either 24 or 48 lbs. per acre. Where acid phosphate and sulphate of potash were used they were given in quantities furnishing 72 lbs. of phosphoric acid and 50 lbs. of potash per acre. The experiments covered the period from 1899 to the present time.

The average yield of the unfertilized plats was 31.06 tons of cane. Where 24 lbs. of nitrogen was applied there was an increase of 1.76 tons over this yield, where 48 lbs. was used an increase of 3.77 tons, where 24 lbs. of nitrogen was used with mixed minerals an increase of 3.33 tons, and where 48 lbs. of nitrogen was used with mixed minerals an increase of 4.22 tons. In 1908 where nitrogen alone was given there was an increase in tonnage over the check plats of 2.67 tons per acre, with 24 lbs. of nitrogen and mixed minerals an increase of 4.88 tons, and with 48 lbs. of nitrogen and mixed minerals an increase of 7.10 tons. These results as compared with the average yields 10 years before show an increase of 0.75, 0.97, and 2.94 tons, respectively.

Fertilizing tobacco, J. T. Crawley (*Estac. Cent. Agron. Cuba Bul. 16, English Ed., pp. 26, pls. 12*).—This bulletin is a report on extensive fertilizer tests with tobacco carried on in different tobacco growing districts for 2 years.

The results indicate that very heavy dressings of barnyard manure are not so profitable as smaller quantities used in connection with green manuring with cowpeas, velvet beans, and similar crops and with applications of commercial fertilizers. On land in good physical condition commercial fertilizers gave much more profitable returns than manure. Phosphoric acid was found to be the dominant element on the red lands. Nitrogen and potash in commercial fertilizers produced but little effect in these experiments. The author recommends sowing velvet beans or cowpeas on well prepared land at the beginning of the spring rains, plowing them under and applying from 5 to 10 tons per acre of barnyard manure or other organic matter about 2 months before the tobacco is to be planted, and to treat the land about 2 weeks before planting with 1,200 to 1,500 lbs. per acre of a fertilizer containing 10 per cent soluble and available phosphoric acid, 10 per cent potash from sulphate or carbonate of potash, and 3 per cent nitrogen derived from sulphate of ammonia, nitrate of soda or dried blood.

Shelter-tent experiments with Sumatra tobacco, W. FREAR (*Pennsylvania Sta. Rpt. 1908, pp. 159–171, pls. 9*).—The work and results described in this article have been noted from another source (E. S. R., 20, p. 1032), with the exceptions that the weather conditions are described in greater detail and that the cost per acre of growing the tobacco at Cocalico is given as $161.81 as compared with $156.75 in the earlier statement.

Turkish tobacco experiments in the Cape Colony, L. M. STELLA (*Agr. Jour. Cape Good Hope, 34 (1909), No. 4, pp. 377–386, figs. 5*).—The results of culture tests with Turkish tobacco are briefly summarized and complete directions for growing, harvesting, and preparing the crop are given. In 1906 when the tests were begun 3,000 lbs. were grown on 7½ acres and sold at an average price of 1s. 6d. per pound. The following years 13,000 lbs. were grown and sold at an average of 1s. 11d. per pound. About 70 acres of Turkish tobacco were planted in 1908 and the production under favorable conditions is estimated at 35,000 lbs.

The Florida velvet bean and its history, KATHERINE S. BORT (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 141, pt. 3, pp. 25–32, pls. 3, fig. 1*).—The history of the Florida velvet bean and the identity of the plant are discussed. The name *Stizolobium deeringianum* n. sp. is proposed and a technical description given.

Variety tests of rye and wheat, N. P. NIELSEN (*Tidsskr. Landbr. Planteavl, 15 (1908), No. 3, pp. 355–382*).—A study of the comparative yielding capacity of wheat and rye at four Danish experiment stations from 1899 to 1904 showed that the average yields of wheat at three of the stations ranged from 78 to 92 per cent of the average yields of rye. At the fourth station where the crops were grown on fallow ground the average yields of wheat from 1900 to 1904 ranged from 88 to 95 per cent of those of rye, and in 1906 and 1907 the yield of wheat was 118 and 126 per cent, respectively, of the rye yields. Squarehead or Stand wheat and Brattingsborg rye were grown in the tests.

Viability of weed seeds in feeding stuffs, C. L. BEACH (*Vermont Sta. Bul. 138, pp. 11–20, pls. 4*).—A commercial feed was found to contain over 20 per cent of apparently unground weed seeds, 26.4 per cent of which possessed the power to germinate. The germinating power of these seeds was destroyed when they were steamed before passing through the alimentary tract of the cow, but when they were fed unsteamed 4 per cent of the seeds found in one sample of feces germinated, and in another sample 5 per cent.

"Weed seeds sorted from this feed were placed rather more than half way down in a 100-ton silo full of mature silage when it was filled about October 1. These were taken out early in December, planted and many of them germinated. Laboratory germination tests also indicated that the heat, fermentation and pressure of the silage did not inhibit germination."

Weed seeds placed in piles of horse or cow manure and kept at temperatures of 120 to 201° F. had rotted at the end of 2 months. A similar trial of one month resulted in a failure of the seeds to germinate, though some of the seeds remained firm. From 2.3 to 12.8 per cent of the weed seeds in calf feces were found to germinate when used as a top-dressing. The harm which may result from these noxious weed seeds is pointed out.

Iron sulphate and mustard, H. A. B. VESTERGAARD (*Ugeskr. Landm., 53 (1908), No. 10, pp. 133–136*).—In experiments at Funen the yields of grains were increased about 60 per cent by applying 50 lbs. per acre of a 10 per cent solution of iron sulphate. Different machines for applying the solution are described and illustrated.

HORTICULTURE.

The artificial retarding of plants, P. Noel (*Naturaliste [Paris], 2. ser., 31 (1909), No. 524, pp. 11, 12*).—The author, who lives in Normandie, had a six-year old plantation of several varieties of plums such as the Boston, Satsuma, Kelsey, etc., which flowered freely every year, but failed to form fruits owing to the frost in early May. A hole 16 in. deep was therefore bored in the ground in the neighborhood of the roots, ether was poured in, and the hole closed. After this root-etherization the trees flowered two weeks later than usual, escaped the late frosts, and set abundant fruits.

Unsuccessful attempts were made to anesthetize the trees by causing the ether to evaporate within a box surrounding the trunk of the tree, also by allowing ether to be absorbed through a hole in the base of the tree. The author concludes that the beneficial effects of ether in retarding growth are due to a refreezing of the soil through rapid evaporation of the ether, rather than through its anesthetic properties.

Fertilizer experiments with vegetables in the vicinity of Milan, A. Menozzi and E. Grüner (*Ric. Lab. Chim. Agr. R. Scuola Sup. Agr. Milano, 3 (1908), pp. 15–47*).—A detailed account is given of cooperative fertilizer experiments with vegetables conducted in the vicinity of Milan, Italy. The general conclusions reached are that chemical fertilizers are more successful both as to yield and profit than sewage, their composition is more reliable, they are more easily applied, and they are better from a sanitary standpoint.

Cabbage growing on the irrigated lands of Colorado, E. R. Bennett (*Colorado Sta. Bul. 143, pp. 3–8, figs. 4*).—This bulletin contains a detailed account of cabbage growing in Colorado under irrigated conditions. The following phases are discussed: History of the industry, soil, climate, soil preparation, planting, irrigation, harvesting, insect pests and diseases, cost of growing and profits, markets, storing, and varieties.

Celery growing in Colorado, L. J. Reid (*Colorado Sta. Bul. 144, pp. 3–12, figs. 6*).—A detailed account of celery growing under irrigated conditions in Colorado, including a discussion of soils, preparation of the land, varieties, seed, seed bed and planting practices, cultivation, irrigation, blanching, storing, harvesting and marketing, the cost of growing, and diseases and difficulties in growing.

Onions, A. McMeans (*Ann. Rpt. Ontario Veg. Growers' Assoc., 4 (1908), pp. 13–35, figs. 22*).—A report on the extent and nature of onion growing in Ontario, including considerable information relative to cultural methods employed in different sections of the United States.

Fruit culture in Crimea, J. Barsacq (*Bul. Mens. Off. Renscig. Agr. [Paris], 8 (1909), Nos. 3, pp. 303–315; 4, pp. 458–467*).—A supplemental account to that previously noted on this subject (E. S. R., 20, p. 839) discussing varieties, methods and cost of culture, orchard management, disease and insects, and fertilizers.

Tillage, fertilizers, and shade crops for orchards, W. Paddock (*Colorado Sta. Bul. 142, pp. 5–16, pl. 1*).—This bulletin discusses the importance and value of orchard tillage, fertilizers, and shade crops, the discussion being based upon practices employed in Colorado as well as those advocated by investigators in other parts of the country.

The author maintains that, although the Colorado soils are fertile, they are usually deficient in humus and that clean cultivation to the exclusion of all cover crops as practiced by the majority of Colorado orchardists is likely to be detrimental to the orchards, since the humus which the soil does contain is apt to be burned out quickly when exposed to the action of the sunshine of

that region during the heat of the summer. He advocates and discusses a system of cultivation which provides for growing a shade crop in the orchard during the hot weather, the land to be plowed at least every second season. In the case of young orchards when the ground is sufficiently fertile, the introduction of some hoed crop is deemed advisable. Although the best shade crop to be used has not yet been determined, red clover appears to be most in favor among those who have used any crop at all. Other crops which have been used to some extent are winter vetch, peas, and alfalfa.

Orchard fertilization, J. P. STEWART (*Pennsylvania Sta. Bul. 91, pp. 3–18, figs. 4*).—This bulletin discusses the present status of our knowledge of orchard fertilization and gives an outline with the results to date of a series of experiments started at the Pennsylvania Station in 1907 with the view of determining the causes affecting yield and quality in apples. In these experiments are being studied the influence of plant food as affected by fertilizers, the influence of moisture as affected by soil management, the influence of cover crops and the influence of heredity as shown by propagation from best individuals and by variety.

The fertilizer work is being conducted in 3 orchards ranging from 9 to 19 years of age. The fertilizers are applied annually at the rates per acre of nitrogen 50 lbs., phosphoric acid 100 lbs., potash 150 lbs., lime 1,000 lbs., and stable manure 12 tons. The data secured in 1908 indicate that the nitrogenous manures have materially increased the yield and decreased the color of the fruit. Phosphoric acid showed decidedly beneficial results only when in combination with other elements. Potash gave fairly favorable results in both yield and color, and lime appeared to decrease both, although this comparative harmful effect of lime is not considered permanent.

The effect of nitrogen applied in the form of nitrate of soda as a top-dressing on July 8, 1907, was plainly evident before the close of August, and during the remainder of the season. In the following spring the trees on the nitrogen plats leafed out much greener than those in the other plats, and continued to show the same marked difference previous to the second application of nitrate of soda late in May. These results suggest the possible desirability of delaying soluble applications of nitrogen such as nitrate of soda until the season's growth is well advanced but not completed, at which time the plant's supply of stored food is about exhausted.

In the soil management experiments clean tillage, tillage and cover crop, sod mulch and sod are being compared in some young orchards from 6 to 15 years of age, and in a mature orchard about 35 years old. As indicated by the yields for 2 seasons, sod mulch in the young orchards shows 30 per cent better yields than clean tillage and 18½ per cent better than the cover crop, while in the mature orchard the cover crop was 40 per cent better than sod mulch.

Where plant-food is needed the author advocates the general recommendation of about 10 tons of stable manure per acre or leguminous cover crops, alternated with a fertilizer carrying about 30 lbs. of nitrogen, 60 lbs. of phosphoric acid, and 100 lbs. of potash per acre. The accompanying soil management suggested for most situations is tillage with a leguminous cover crop while the orchard is young, followed by a mixed grass and leguminous sod or sod mulch when bearing age and size is reached, with a return to tillage every second or third year after the bearing habit is established, increasing the frequency of tillage with the age of the orchard and the demands of the fruit.

In some related observations it was found that apple roots extend much farther laterally than is generally supposed, reaching in some cases more than 3 times as far as the spread of the branches. This fact suggests a wider area of distribution for fertilizers and mulches.

During the past season the soil management systems varied greatly in ability to conserve moisture. On one fairly porous soil tillage conserved the moisture much better than a 3-ton per acre sod mulch, and was superior to sod even when the latter was kept closely cropped and the grass left on the ground. Under the above conditions, the sticking qualities of Baldwin apples on the tillage plats were 52 per cent greater than on the sod-mulch plats. Northern Spies, however, showed no material differences in this respect.

[Report of the experimental horticulturist], J. P. STEWART (*Pennsylvania Sta. Rpt. 1908, pp. 192–198, pls. 4*).—An outline is given of experiments being conducted by the department of experimental horticulture in connection with a study of the causes which affect the yield and quality in apples. The results of these experiments for 1907–8 are abstracted above.

Whole v. piece root grafting, J. P. STEWART (*Pennsylvania Sta. Rpt. 1908, pp. 198–200*).—An experiment was started at the station in 1897 to test the relative merits of grafting apple trees on whole roots and on piece roots. Ten varieties of Hungarian apples of 6 trees each were received from the U. S. Department of Agriculture. Two trees of each variety were grafted on whole root, 2 on a top-piece root, and 2 on a bottom-piece root. The trees were measured in 1908, 11 years after planting, and the measurements and differences are shown in tabular form.

The advantage is slightly in favor of the top-piece root method of grafting with the whole-root method second. This is shown to be contrary to the results of similar work reported by the Alabama Station (E. S. R., 10, p. 1042) in which the advantage was slightly in favor of trees grafted on the lower half of the root with those made on the whole root third.

A comparison of tillage and sod mulch in an apple orchard, U. P. HEDRICK (*New York State Sta. Bul. 314, pp. 77–132, pls. 8, dgm. 1*).—An account with the results secured to 1908 inclusive is given of a ten-year experiment started in 1903 and being conducted by the station to determine the relative values of tillage and sod mulch in orchard management. The experimental orchard consists of about 9½ acres of Baldwins set out in 1877. The results secured to 1907 inclusive have been previously noted from another source (E. S. R., 20, p. 337).

As indicated by the yields, the tilled trees are yearly increasing their bearing capacity, whereas the sod-mulch trees are decreasing in fruitfulness. The average annual yield per acre on the sod plat for the past 5 years was 72.9 bbls., and for the tilled plat 109.2 bbls. The fruit from the sod plat is much more highly colored, and matures from 1 to 3 weeks earlier than that on the tilled plat. The fruit from the tilled plat is larger, more juicy, crisper, and of better flavor. It keeps 4 weeks longer in common storage than that from the sod plat, but there appears to be no difference in the keeping quality of the two classes of fruit in cold storage. Tillage exerted a favorable influence on the uniformity of trees and crops, the trees grown in sod showing abnormalities in foliage, branches, and roots, as well as in fruit bearing and in fruit characters.

The sod-grown trees made an average annual gain in trunk diameter of 1.1 in. as compared with 2.1 in. with tillage grown trees. The leaves on the tilled trees were better in color, larger, more numerous, heavier, 3 or 4 days earlier in coming out, and a week or 10 days later in falling than the leaves on the sod-grown trees. Sodded trees made an average annual branch growth of 1.9 in. as compared with 4.4 in. for tilled trees, with about twice as many laterals per branch on the tilled trees. During the dormant season the new wood on the tilled trees was plumper and brighter in color, indicating better health, and there was less dead wood than on the sod-mulch trees.

The root systems of the tilled trees are approximately circular, while those of the sodded trees are very irregular, "indicating a reaching out of a part of the roots in response to a demand for more moisture, food, or air or to escape some evil effect of the grass roots." Sodded trees growing next to the tilled land showed better health and greater productivity than the trees on the inner sodded rows.

The average cost per acre of management, exclusive of harvesting, was $17.92 for the sodded plat and $24.47 for the tilled. The average net income per acre for the sodded plat was $71.52 and for the tilled plat $110.43, an increase of 54 per cent.

The following reasons are given why tillage seems to be better than sod for the apple:

"The results of 120 moisture determinations in the Auchter orchard show that the differences in tree growth and crop in the two plats of this experiment are mainly due to differences in moisture, the tilled plat having most moisture.

"As a consequence of the reduced water supply in the sod plat, there is a reduced food supply; for it is only through the medium of free water that plants can take in food. Analyses show that the differences between the actual amounts of plant food in the two plats are very small.

"Analyses show that there is more humus in the tilled plat than in the sod plat, contradicting the oft-made assertion that the tillage method of managing an orchard 'burns out the humus.'

"At a depth of 6 in. the tilled soil is 1.1° warmer in the morning and 1.7° at night than the sod land; at 12 in. the tilled soil is 2.3° warmer in the morning and 1.8° in the evening.

"We are justified, without the presentation of specific data, in saying that a tilled soil is better aerated than sodded land.

"Soil investigators are well agreed that beneficial micro-organisms are found in greater numbers in a cultivated soil than in other soils."

Although the experiment does not show that apples can not be grown in sod, it was noticed that the sodded trees began to show ill effects the first year the orchard was laid down to grass, and each succeeding year showed greater injury.

How sod affected an apple orchard, F. H. Hall (*New York State Sta. Bul. 314, popular ed., pp. 3–20, fig. 1*).—A popular edition of the above.

Apple culture in Vermont, W. Stuart (*Vermont Sta. Bul. 141, pp. 63–100, pls. 8, fig. 1*).—This bulletin discusses the extent and development of the apple industry in Vermont, and contains detailed suggestions relative to the starting, culture and care of an orchard, and the disposal of the crop.

Picking and packing citrus fruits, M. J. Iorns (*Porto Rico Sta. Circ. 8, pp. 4–20, figs. 2*).—This circular contains suggestions on the practice and principles of picking and packing citrus fruits. The information given is based largely upon the experience of successful growers in all the citrus growing regions of the world as gleaned from various publications on the subject.

Small fruits in 1907, J. P. Pillsbury (*Pennsylvania Sta. Rpt. 1908, pp. 205–217*).—Notes are given on the varieties of strawberries, raspberries, blackberries, currants, and gooseberries tested at the station during the season of 1907, and with the exception of the raspberries and blackberries, tabular data are reported indicating the flowering and fruiting periods and the vigor of the different varieties.

With the view of arriving at the relative merits of wide-matted row and narrow-matted row systems and the hill system of culture, some data were compiled relative to the average size of 10 varieties of strawberries which have

been grown continuously during the past 12 years. The results appear to disprove the theory that the hill system produces the largest average size fruit. When the yearly averages are taken the narrow-matted row appears to produce the largest and most uniform grade of fruit, while the hill system yields the smallest berries.

Grape growing, O. B. WHIPPLE (*Colorado Sta. Bul. 141, pp. 3–16, figs. 8*).—This bulletin contains detailed suggestions for grape growing under irrigated conditions in Colorado, in which the following phases are considered: Soils and locations, propagation, preparation of land, planting, cultivation, irrigation, pruning, summer pruning, winter protection, fertilization, picking, packing, varieties, insects and diseases. Estimates are also given on the cost of growing and returns.

Studies conducted in the experimental vineyards of Messina on the resistance, breeding, and culture of American grapes during the biennial period 1907–8, LA FAUGI (*Bol. Min. Agr., Indus. e Com. [Rome], 8 (1909), Ser. C, No. 10, pp. 10–18*).—This is a report on studies conducted with a large number of European and American grapes and their hybrids, including grafted and direct bearing vines, relative to their resistance to phylloxera, their production, culture and condition. The important data are classified in tabular form.

Adaptability of the white and red Delaware grapes, G. DE ISTVÁNFFI (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), pp. 60–62*).—As a result of tests conducted for 6 years in the Hungarian state nurseries, both the white and red Delaware grapes were found to be unsatisfactory as regards their resistance to phylloxera, their yield, and the production of high grade wine.

Practical advice to grape growers, M. D. CHAULIAC (*Bul. Off. Gouvt. Gén. Algérie, 1909, No. 10, Sup., pp. 75–106*).—Practical directions, including methods of culture, propagation and varieties for reconstituting phylloxera-infested Algerian vineyards with American grape stocks, are given. The appendix contains data relative to the cost of replanting vineyards.

[Note on injury to nursery stock by fumigating with hydrocyanic-acid gas], C. W. WAID (*Ohio Sta. Circ. 89, pp. 7, 8*).—The author reports a suspected case of hydrocyanic-acid gas poisoning of young apple trees secured from a nursery in which the trees had been fumigated for San José scale. He is of the opinion that the possible danger of injury to nursery stock not perfectly dormant when thus fumigated is sufficient to warrant careful and thorough investigation.

Fertilization of the almond tree, G. A. COWIE (*Trop. Life, 5 (1909), No. 5, pp. 68–70, figs. 3*).—The author suggests fertilizer formulas for growing almonds on different types of soil, and gives the results of a manuring experiment with almonds conducted with E. Albiach, Alicante, Spain, in which a complete fertilizer consisting of 330 lbs. of superphosphate, 80 lbs. of nitrate of soda, 80 lbs. of sulphate of ammonia, and 450 lbs. of kainit gave a yield per acre of 1,532 lbs. of almonds, as compared with 433 lbs. per acre on unmanured land. This increase in yield was secured at an added cost per acre for fertilizer of about $30.

A revised list of the plats on the experiment station, Peradeniya, R. H. LOCK (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1909), No. 15, pp. 125–140, map 1*).—This is a guide to the plats of the Peradeniya experiment station, the majority of which are planted to cacao, rubber, coconuts, and tea. The data for each plat consist of a brief record relative to its past history, and its condition at the end of 1908.

The science of plant breeding, H. H. GROFF (*Ann. Rpt. Hort. Socs. Ontario, 3 (1908), pp. 76–85, figs. 6*).—A popular discussion of plant-breeding methods with frequent references to the author's work in breeding gladioli.

FORESTRY.

Key to New England trees, J. F. Collins and H. W. Preston (*Providence, R. I., 1909, pp. 42*).—This pamphlet consists of a key to the wild and commonly cultivated trees of New England, including some of the trees which grow in adjacent States. The key is based primarily on leaf characters. Directions are given for its use, together with references to more complete works on the subject.

The tree book, Mary R. Jarvis (*New York and London [1909], 2. ed. rev., pp. 132, pls. 31*).—Popular discussions together with the distinguishing characteristics and illustrations are given of a large number of the more common British trees.

The adaptability of Douglas spruce (Pseudotsuga taxifolia), A. Jolyet (*Rev. Eaux et Forêts, 48 (1909), No. 11, pp. 321–331, maps 2*).—A discussion of the comparative adaptability of the Pacific coast and Colorado forms of the Douglas spruce to different European conditions.

The culture of forest trees (*Die Pflanzenzucht im Walde. Berlin, 1907, 4 ed., rev. and enl., pp. XII+383, figs. 66*).—This is a handbook for foresters and students. It treats in detail of the culture of young forest trees including seed bed and nursery practices, packing and shipping. Special rules are given for the culture of various species of conifers and hard woods.

A primer of forestry, II, G. Pinchot (*U. S. Dept. Agr., Farmers' Bul. 358, pp. 48, figs. 25*).—This is a popularized edition of part 2 of Bulletin 24 of the Forest Service of this Department (E. S. R., 17, p. 43). Part 1 of the above publication has also been issued as a Farmers' Bulletin (E. S. R., 15, p. 158).

A manual for northern woodsmen, A. Cary (*Cambridge, Mass., 1909, pp. 250, figs. 80, maps 3*).—This pocket manual treats in detail of land surveying, the making of forest maps, log and wood measurement, and timber estimating. Numerous tables relating to these subjects, together with miscellaneous tables and information, are also given. Various text-books and other publications have been drawn on in preparing the work, but the sections on the practice of map making and timber estimating are largely derived from the author's personal experience and observation.

Timber production and the industrial properties of wood, E. Laris (*Rohholzgewinnung und Gewerbseigenschaften des Holzes. Vienna and Leipsic, 1909, pp. 184, figs. 37*).—A small manual for lumbermen and wood workers.

Part 1 deals with the exploitation and shaping of timber for building purposes and other uses. Part 2 discusses the various industrial properties of woods, including the interior and exterior development of wood cells, change in shape after felling and working, specific weight, hardness and cleavage resistance, strength of various species, color, texture and knot formation, durability under natural conditions and with the use of preservatives, defects and diseases, exterior and interior means for determining the condition of soundness, the characteristics of deadwood, and the heating power of woods.

Preliminary statement regarding the forestry problems in Vermont, A. F. Hawes (*Vermont Sta. Bul. 139, pp. 23–36, pl. 1*).—This bulletin, which is Forest Service Publication No. 1 of the Vermont Station, contains a brief discussion of the purposes and objects of forestry, outlines the work of the State forester's office, and gives instructions regarding forest planting.

State parks for Wisconsin, J. Nolen ([*Madison, Wis., 1909*], *pp. 56, pls. 33*).—This is the report of the landscape architect to the Wisconsin State Park Board discussing the justification and need of State parks for Wisconsin, and the requirements and available sites for these parks, and giving recommendations for the establishment of a park system.

DISEASES OF PLANTS.

The constancy of mutants; the origin of disease resistance in plants. H. L. Bolley (*Amer. Breeders' Assoc.* [*Proc.*], *4* (*1908*), *pp. 121–129*).—A criticism and discussion of De Vries's mutation theory is given, and attention is called by the author to what he believes to be a fundamental principle of plant breeding, namely, that in order to maintain a standard of a crop the condition under which a character is originated or is being originated must be maintained or at least approximated.

A description is given of the author's work in developing disease resistance in plants and of the results obtained, and from his observations he is led to conclude "(1) that mutations may be so insignificant and numerous as to be unrecognizable and thus fall directly into the class called by De Vries 'fluctuating variations,' or (2) that they may be induced in a mixture of a great number of varieties of a species at one and the same time because of the same environmental causes, or (3) that in some cases 'fluctuating variations' are of such nature and worth as to allow results to be obtained in mass breeding of as great importance as any that we may hope to obtain by looking for a single mutating type."

In relation to disease resistance, the author states that he is unable to determine whether resistance is due to structural or physiological changes in the plant. There appears to be some evidence pointing to the probable influence of chemical agencies, such as toxins, arising from the direct existence of fungus attacks upon the hosts.

Comparative investigations on the effect of various methods of seed treatment on the germination of seed, H. Burmester (*Ztschr. Pflanzenkrank., 18 (1908), No. 3, pp. 154–187*).—Laboratory and field studies were made to determine the effect of various seed treatments recommended for the prevention of cereal smuts. Among the fungicides tested on oats, wheat, and barley were copper sulphate, Bordeaux mixture, sulphuric acid, Ceres powder, formalin, hot water, hot air, and picric acid, the effect on the seed being determined by germination tests.

Soaking the grain for 14 hours in copper sulphate solutions ranging from 0.5 to 2 per cent proved injurious to all seeds whether limed or not, although the oats were much less injured than the other grains. Treating the seed with 2 per cent Bordeaux mixture which was allowed to dry on the grain was not injurious. Sulphuric acid proved unsutiable for the treatment of grain for smut prevention. Ceres powder proved somewhat injurious to all the grains. Strong solutions of formalin reduced germination, but when seed was soaked for 4 hours in 0.1 per cent solutions or less all the grains gave high germinations. Soaking the seed for 5 minutes in water heated to about 53° C. was only slightly injurious to wheat but somewhat destructive of oats and barley. Treating seed grain with air heated to 75° C. slightly reduced its germinative power, but the treated grains sprouted more quickly than the untreated, and this method seems worthy of extended use. Picric acid, and especially the form called Reflorit, is useless as a disinfection material.

In field practice treating the seed grain with copper sulphate with or without liming and the use of formalin are recommended as the most efficient means of controlling smut.

Notes on some potato diseases, W. Kreitz (*Illus. Landw. Ztg., 29 (1909), No. 18, p. 176, figs. 5*).—Descriptions are given of a number of forms of potato scab, among them the pock scab, the common scab, and the black scab or canker caused by *Chrysophlyctis endobiotica*.

A dry scab of potatoes (*Jour. Bd. Agr. [London], 16 (1909), No. 1, pp. 31, 32*).—A brief description is given of a disease of potatoes due to *Spondylocladium atrovirens*. The injury is confined to the tubers and there are no indications of the presence of the fungus on the foliage. It causes a disfigurement of the surface of the tuber, followed by local spots of dry rot. All affected potatoes should be rejected in planting.

Investigations on the leaf curl disease of potatoes, T. Remy and G. Schneider (*Fühling's Landw. Ztg., 58 (1909), No. 6, pp. 201–219, map 1*).—After discussing the various causes that have been claimed to induce the leaf curl disease of potatoes, the authors give an account of its distribution in the Rhine Provinces, in some parts of which the potato yield for 1908 is said to have been reduced fully 50 per cent by reason of the disease.

The relative susceptibility of different varieties of potatoes to the disease, as determined by 3 years' observations, is shown. The relation of soils, weather, and situation to the disease is discussed. Weather conditions are held to be only incidental to the development of the disease, although the worst outbreak came in a season which was characterized by cool, moist weather in May, followed by hot weather in June, with considerable rain and an unusually hot and dry autumn. Varieties that had been previously only slightly affected were severely attacked during this season.

There appears to be evidence that the disease may be spread through seed tubers, and only sound potatoes of the most resistant varieties should be used for seed purposes.

The potato harvest of 1908 and the leaf curl disease, O. Appel (*Illus. Landw. Ztg., 29 (1909), No. 18, pp. 176–178*).—An account is given of the diminished yield of potatoes in Germany in 1908, and the relation of the leaf curl thereto is pointed out.

A contribution to the study of brusone of rice, U. Brizi (*Ann. Ist. Agr. [Milan], 7 (1905–6), pp. 107–174*).—A critical review is given of literature relating to the disease of rice known as brusone. The author claims that the disease is due in the first place to physiological disturbances of the root system resulting in incomplete respiration, and in functional disturbances that are finally changed into true lesions on the root system. These may precede exterior manifestation of the disease. He further claims that brusone can not be attributed solely to fungi occurring on the aerial portions of the plant.

Report of plant pathologist, F. M. Rolfs (*Missouri Fruit Sta. Rpt. 1907–8, pp. 16–18, pl. 1*).—The work done in plant pathology during the biennial period covered by this brief report has consisted of a general survey of the fruit diseases of the State, a preliminary report of which has been noted (E. S. R., 20, p. 347). The work has since been continued along similar lines, considerable time being given to the investigation of the diseases of the peach, plum, and apple, while some attention has been given to those of the blackberry and raspberry.

In the laboratory a careful study made of *Cytospora rubescens* and *Valsa leucostoma* occurring on peach and plum trees has shown that the Cytospora, which is very common on stone-fruit trees, is the pycnidial form of the other fungus. This organism is said usually to gain entrance to the trees through the buds, and when infection occurs on the trunks and the conditions are favorable for its growth it produces large wounds which are often spoken of as "sun scald." A full account of the investigations leading to the discovery of the relationship between these two fungi will be issued soon.

Brief notes are given on the defoliation of peach trees, due to the bacterial shot-hole disease, and on the root rots of peach and apple trees.

Lime-sulphur wash for apple scab, R. K. BEATTIE (*West. Fruit-Grower, 20 (1909), No. 1, pp. 6, 7*).—An account is given of spraying experiments conducted in 1907 with Bordeaux mixture and in 1908 in which Bordeaux mixture and lime-sulphur wash were compared.

In 1908 a maximum of 3 sprayings was given as a preventive of scab, and the lime-sulphur wash was found to excel the Bordeaux mixture under the conditions of the experiments. On the basis of one year's investigations, the author recommends for the prevention of apple scab the use of a lime-sulphur wash composed of sulphur 1 lb., lime ½ lb., and water 5 gal. The number and dates of sprayings necessary are yet to be definitely determined.

Fighting apple scab in the Middle West, W. M. SCOTT (*West. Fruit-Grower, 20 (1909), No. 1, pp. 5, 6, figs. 7*).—A somewhat popular account is given of investigations which have been carried on by the Bureau of Plant Industry of this Department either as demonstration experiments or in connection with some of the stations in the Middle West. These have been conducted with a view to combating apple scab, leaf spot, and codling moth.

The results obtained in Arkansas and Nebraska in 1908 were quite favorable to the use of a 5:5:50 Bordeaux mixture. Two brands of factory-boiled or concentrated lime-sulphur solution were tested and found to adhere better and remain effective longer than the self-boiled mixture, but owing to the interference of frost and excessive rains the experiments were not satisfactory and the results are not considered conclusive. In the experiments for the prevention of peach diseases scab, black spot, and brown rot were held under control by the lime-sulphur spray, and on varieties of apples subject to Bordeaux injury this spray is recommended.

Spraying for brown rot of the peach, 1908, C. A. MCCUE (*Delaware Sta. Bul. 85, pp. 3–12*).—During 1908 the author carried on a series of cooperative spraying experiments with different varieties of peaches to test the self-boiled lime-sulphur wash as a fungicide for the prevention of brown rot of the peach, due to *Sclerotinia fructigena*. Comparisons were also made of a number of other fungicides.

As a result of one year's experiments with self-boiled lime-sulphur mixture, it appears that brown rot can be materially lessened by 3 or 4 sprayings, but that under some conditions considerable injury is done to the peach foliage. This may be prevented to a large degree by preparing the wash with cold instead of hot water. One of the principal objections to the use of this mixture is a heavy deposit of lime upon the fruit, and on this account the treatment can not be considered a success.

The mixture proved an excellent remedy for the prevention of peach scab, and the author believes that 2 sprayings, one about May 10 and the other about June 1, would prove sufficient for ordinary attacks of the scab in the region where the experiments were carried on.

The other mixtures experimented with were the Rex brand of lime sulphur, benzoate Bordeaux, a boiled lime-sulphur mixture, sulphur water, and a strong homemade lime-sulphur wash. None of these proved safe and reliable remedies for the prevention of the brown rot of the peach. The commercial lime-sulphur washes are somewhat promising, but their action on the peach foliage is not sufficiently understood as yet to warrant giving definite directions for their use.

Hypochnose of pomaceous fruits, F. L. STEVENS and J. G. HALL (*Bot. Gaz., 7 (1909), No. 1, pp. 49–59, figs. 8*).—A description is given of a disease of pomaceous fruits due to *Hypochnus ochroleucus*.

This fungus causes a leaf blight, and its effect on the host plant resembles in some respects that of the bacterial fire blight of pears and apples. The later

stages of the disease show, however, that only the leaves are affected. The twigs are found carrying the fungus, but do not die from its presence. They seem to be injured only indirectly through the destruction of the leaves.

The fungus was first described from Brazil, occurring on apples and quinces, and there appears to be little doubt of the identity of the present material. The disease is said to prevail generally throughout the mountain section of North Carolina and is also known to be present in West Virginia and Alabama, while other observations seem to indicate a still wider spread.

As the fungus winters in a purely superficial manner upon the twigs, depending but slightly on spores for its propagation, it is believed that thorough spraying in the spring will result in its control.

The treatment of the downy mildew of grapes, H. GOUTHIÈRE (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 17, pp. 507–514*).—Suggestions are given for the control of the downy mildew of the grape, and the relative merits of Bordeaux mixture, Burgundy mixture, and copper acetate solutions are discussed. The author states that in order to be effective the proper time must be chosen for the application of the fungicides and the purest possible chemicals should be employed in their manufacture.

The bud rot and some other coconut troubles in Cuba, W. T. HORNE (*Estac. Cent. Agr. Cuba Bul. 15, English Ed., pp. 43, pls. 15*).—The author describes the bud rot of coconut, giving an account of its history and occurrence in Cuba and the symptoms by which its presence may be recognized; discusses the various attributed causes, and suggests methods for its control.

The presence of the disease is first recognized by the dropping of the young fruits, followed by the fading or yellowing of the leaves, and later by the characteristic rotting of the undeveloped leaves in the center of the top.

A number of fungi and bacteria have been isolated from the affected portions of the trees, and associated with the disease are a number of insects.

Among the remedial measures suggested are the destruction of the tops of all dead or seriously affected trees, flaming or burning out the tops of all early or suspected cases, and spraying with Bordeaux mixture for the protection of healthy trees.

Among the minor diseases described are the coconut leaf spot due to *Pestalozzia palmarum*, leaf dwarfing, the cause of which is not well understood, and water injury. In addition descriptive notes are given on a number of insect and other animal pests.

A Funtumia disease, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1909, No. 3, pp. 147, 148*).—A description is given of a canker disease affecting one of the rubber trees (*Funtumia elastica*), the cause of which is said to be *Nectria funtumiæ* n. sp. A technical description of the fungus is presented. In general appearance and mode of extension, the disease is apparently similar to the cacao canker disease of Ceylon, which is also due to a species of Nectria.

Diseases of the almond, G. ARNAUD (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 15, pp. 451–456*).—Descriptions are given of the gummosis of the almond due to *Coryneum beyerinckii*, leaf curl (*Exoascus deformans*), leaf spot (*Polystigma ochraceum*), spot disease of the twigs (*Fusicoccum amygdali*), rust (*Puccinia pruni*), and anthracnose (*Glœosporium amygdalinum*), together with suggestions for the use of fungicides in combating these diseases.

The appearance of oak mildew in Württemberg, O. KIRCHNER (*Naturw. Ztschr. Forst u. Landw., 7 (1909), No. 4, pp. 213–217*).—The occurrence of oak mildew in Württemberg is announced, the species attacked being for the most part *Quercus sessiliflora* and *Q. pedunculata*. An examination of the material showed the conidial stage of the fungus present in 34 forest districts. In 2 instances the perithecia were found, and a study of the fruiting bodies led

the author to the conclusion that the fungus is *Phyllactinia corylea*, which also attacks the hazel.

A study of the mildew of the peach in relation to the new mildew on the oak, G. Cuboni and L. Petri (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), I, No. 7, pp. 325–326*).—A comparative study was made of the mildew occurring on peaches, roses, etc. (*Sphærotheca pannosa*), and of what the authors consider a new species the conidial form of which has been quite prevalent on oaks in southern Europe.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A treatise on zoology, edited by E. R. Lankester (*London, 1909, pt. 1, pp. XXII+296, figs. 151*).—This is the first of two fascicles upon the protozoa.

Section A on the Proteomyxa is by S. J. Hickson, Section B on the Heliozoa by W. F. R. Weldon and S. J. Hickson, Section C on the Mycetozoa by J. J. Lister, Section D on the Lobosa by S. J. Hickson, Section E on the Radiolaria by F. W. Gamble, Section F on the Mastigophora by Arthur Willey and S. J. Hickson, and Section G on the Hæmoflagellates and allied forms, including a list of the known natural hosts, by H. M. Woodcock. A bibliographical list is given at the end of each section.

Appendix A includes the Chlamydomyxa, by J. J. Lister, and Appendix B the Xenophyophoridæ, by F. E. Schultze.

Treating seed corn to protect it from burrowing animals, T. H. Scheffer (*Kansas Sta. Circ. 1, pp. 4*).—This circular was prepared partly to supply timely information on the subject and partly to secure the cooperation of farmers in testing the various methods proposed. Examinations of the stomach contents of over 150 specimens taken in all months of the year have shown that mice and not moles are responsible for the numerous depredations.

Experiments in methods of preventing the theft of seed grains in the ground have followed three lines—baiting the pests some days in advance of planting, regular planting of poisoned seed, and surface coating of seed with ill flavored substances, and the results with each are briefly discussed. Kerosene, crude petroleum, copperas, crude carbolic acid, fish oil, and spirits of camphor, when used in sufficient quantity or strength to impart an odor to the corn, were found to seriously injure the germinating powers of the grain. Mixing pulverized gum camphor with the dry grain and storing it in a closed vessel for some days, which has been recommended as an efficient treatment, gave negative results. Pine tar has a strong odor but leaves the grain too sticky to work in a planter. Coal tar makes an ideal coating of a rich brown color and a persistent gassy smell. It dries nicely, is not in the least sticky, and will work well in the planter. Soaking corn in strong tobacco decoction for a few hours or simply wetting it with the liquid also seems to promise good results. It is stated, however, that no final recommendations can as yet be made.

The crow as a menace to poultry raising, L. J. Cole (*Rhode Island Sta. Rpt. 1908, pp. 312–316*).—This is a brief discussion on the economic importance of the common crow as related to poultry raising. Losses in 1908 on two poultry farms are reported, one in which about 25 per cent of the chickens hatched out were taken, and another in which nearly 87 per cent of the ducklings were carried away by crows. The eggs of the turkey, which is commonly allowed to roam and select its nesting site far removed from the house or poultry yard, are said to be especially liable to destruction by crows.

A plea for the protection of our birds, L. Bruner (*Insect Pest and Plant Disease Bur. Nebr., Circ. 11, pp. 4, dgm. 1*).—A brief account of the value of birds as destroyers of injurious insects.

Report on the spring migration of 1908, W. STONE (*Cassinia, 1908, No. 12, pp. 45–52*).—The records of the spring migrations of birds here reported are based on reports from 56 stations in New Jersey and Pennsylvania.

[Bibliography for 1908] (*Cassinia, 1908, No. 12, pp. 53–64*).—Fifty-seven papers, largely relating to the birds of Pennsylvania, New Jersey, and Delaware, are listed.

Animal parthenogenesis, L. DONCASTER (*Sci. Prog. Twentieth Cent., 3 (1908), No. 9, pp. 40–52*).—This brief review of the subject, accompanied by references to the literature, is of particular interest to the entomologist.

Sex determination and parthenogenesis in phylloxerans and aphids, T. H. MORGAN (*Science, n. ser., 29 (1909), No. 736, pp. 234–237*).—The phylloxera of the hickories are said to offer exceptional opportunities for a study of sex determination and parthenogenesis. In some species three generations can be followed within the same gall, two parthenogenetic and one sexual. The author has studied the cytological aspects of the life cycle of phylloxera and here presents an account of the chromosomal changes that occur in connection with sex determination. *Phylloxera fallax* and *P. caryæcaulis* are the species here considered.

The Sphegoidea of Nebraska, H. S. SMITH (*Univ. [Nebr.] Studies, 8 (1908), No. 4, pp. 323–410, pl. 1*).—This is a paper based on material contained in the collection of the University of Nebraska. Of the 200 species recorded 118 were taken in Sioux county and 60 have not been taken elsewhere within the State.

On some undescribed Scolytidæ of economic importance from the Indian Region, E. P. STEBBING (*Indian Forest Mem., 1 (1908), No. 1, Zool. Ser., pp. 12*).—The author describes 4 species of Sphærotrypes, 5 species of Polygraphus, and 2 species of Dryocetes as new to science. Life history notes are also given.

Descriptions of new curculionid beetles of the tribe Anthonomini, W. D. PIERCE (*Proc. U. S. Nat. Mus., 34 (1908), pp. 173–181*).—In the investigations of parasites of the boll weevil made by the Bureau of Entomology of this Department, numerous new species of weevils have been met with. The author here presents descriptions of 2 genera (Smicraulax and Mecynopyga) and 10 species hitherto undescribed. These are accompanied by breeding and collecting records.

Contributions to the study of Japanese Aphididæ, I and II, G. OKAJIMA (*Bul. Col. Agr., Tokyo Imp. Univ., 8 (1908), No. 1, pp. 13–26, pls. 4*).—The first of these two articles is on the structure of the antennæ of Aphididæ, the second upon 3 new species of Trichosiphum in Japan.

Remarks on Indian scale insects (Coccidæ), III, E. E. GREEN (*Mem. Dept. Agr. India, Ent. Ser., 2 (1908), No. 2, pp. 15–46, pls. 3*).—A paper in continuation of a series previously noted (E. S. R., 12, pp. 369, 1067). The author presents notes on the occurrence and food plants of a number of species, together with descriptions of 1 genus and 18 species new to science. A catalogue of all the species hitherto recorded from India is appended, in which 102 species are listed, exclusive of varieties.

Notes on Indian scale insects (Coccidæ), H. M. LEFROY (*Mem. Dept. Agr. India, Ent. Ser., 2 (1908), No. 7, pp. 111–137, pls. 3, fig. 1*).—Notes on the food plants are given and the life cycles of *Monophlebus stebbingi octocaudata*, *Icerya minor*, and *Dactylopius saccharifolii* are described in detail. The numbering of the species is that of Green's list, noted above.

Gall midges of the goldenrod, E. P. FELT (*Ottawa Nat., 22 (1909), No. 11, pp. 244–249*). This account includes a table of the galls supplemented by brief descriptions of the insects bred therefrom.

British flies, G. H. VERRALL (*London, 1909, vol. 5, pp. 780+34, pl. 1, figs. 407*).—In this, the second volume published on British flies and the fifth of the work on British Diptera, the families Stratiomyidæ, Acanthomeridæ, Leptidæ, Tabanidæ, Nemestrinidæ, Cyrtidæ, Bombylidæ, Therevidæ, Scenopinidæ, Mydaidæ, Apioceridæ, and Asilidæ are taken up. A systematic list of the Palæarctic Diptera Brachycera is appended.

The mouth parts of the solitary bees, R. DEMOLL (*Ztschr. Wiss. Zool., 91 (1908), No. 1, pp. 1–51, pls. 2, figs. 11*).—This is a description of the mouth parts of the solitary bees, accompanied by drawings and a bibliography.

Notes on some western Orthoptera; with the description of one new species, A. N. CAUDELL (*Proc. U. S. Nat. Mus., 34 (1908), pp. 71–81*).—This is a record of collections of Orthoptera made on a trip through the western part of the United States. The species *Marsa tuberculata* collected at Eureka, Cal., is described as new.

Report of the State entomologist, E. F. HITCHINGS (*Ann. Rpt. State Ent. Maine, 3 (1907), pp. 105, pls. 20, figs. 11; Agr. of Maine, 1907, pp. 205–306, pls. 20, figs. 11*).—Brief notes are presented on the insects of the year.

Many of the asters in nurseries are said to have been badly infested during August by the plant louse *Nectarophora ambrosiæ*. *Conopthorus coniperda* was received in twigs of the red pine. The tarnished plant bug (*Lygus pratensis*) was the source of injury to the buds of dahlias. The American silkworm (*Samia cecropia*) was frequently received at the station. The buck moth (*Hemileuca maia*) occurs in a number of places in the State. Numerous letters were received regarding the caterpillars of the Io moth (*Automeris io*), which is common throughout Maine. The mourning cloak butterfly (*Euvanessa antiopa*) has become a pest within the past few years. The maple borer (*Plaginotus speciosus*) is said to be causing a great deal of damage to shade trees.

A number of parasites which came under observation during the year are reported. The larvæ of *Vanessa atalanta* were infested with the tachinid *Exorista futilis*, tent caterpillars were badly attacked by *Tachina mella*, and red-humped caterpillars were parasitized by *E. chelonia*. Several specimens of the common Pimplas, *P. pedalis* and *P. conquisitor*, emerged from the pupæ of the brown-tail moth. The tachinid *Frontina frenchii* is said to be a very common enemy of the Cecropia, while *Cryptus extrematis* and *Ophion bilineatus* were bred from this moth.

A list is given of many of the insects that were taken under burlap in the course of the gipsy moth work. A detailed account of the brown-tail and gipsy moth work in the State is accompanied by numerous figures and original photographs. A brief report is included of the State exhibitions of injurious insects at fairs, of entomology in schools, and of publications and circular letters of the year. The principal insects of the orchard are considered in connection with a somewhat extended account of Maine apple orcharding.

Twelfth report of the State entomologist, F. L. WASHBURN (*Rpt. State Ent. Minn., 12 (1907–8), pp. X+205, pl. 1, figs. 103*).—Much of the information here presented has been noted from another source (E. S. R., 20, p. 1049).

Many reports of grasshopper ravages were received during the year. Directions for combating them by means of hopperdozers, etc., and the Minnesota grasshopper law as revised in 1905 are given.

Eggs of the spring grain aphis (*Toxoptera graminum*) were found on grass at St. Anthony Park April 7 and 23, 1908, showing that the eggs may survive the winter in Minnesota. Records kept of the number of young produced by the first individual born in each of 17 generations (between April 14 and August 25) gave a total of 959, or an average of 57 per generation. A second series of 20

generations extending from January 22 to August 31 gave a total of 814, or 41 young per generation, while a third series of 22 generations extending over the same period gave a total of 1,117, or an average of 51 young per generation. The average number of young produced by the first form of each generation of the third series was 50.

Notes are presented on the English grain louse (*Macrosiphum granaria*), the life history of which is under investigation. Records kept of the number of young produced by the first offspring of each of 13 generations (between April and October) gave an average of 16 young, while in a second series an average of 14 young was recorded. The thirteenth generation of this species was still producing young on October 19. The European grain louse (*Siphocorynæ avenæ*) was found attacking the leaves and young stems of wheat, oats, barley, and rye, and later the heads of the same grains. In 1907 it was generally distributed over the State. An average of 15 young were produced by the first born of each of 7 generations between January 10 and March 11. The corn leaf louse (*Aphis maidis*) was collected from grain and *Macrosiphum trifolii* from corn.

A report on nursery inspection for 1908 is here given, in which is included a compilation of the latest laws in the different States relating to nursery inspection and nursery shipments. Notes are also given on the grape flea beetle (*Haltica chalybea*), the grape phylloxera, buffalo tree hoppers (*Ceresa bubalus* and *C. taurina*), the strawberry root louse (*Aphis forbesi*), black flies, etc.

In a preliminary report upon the work with stalk borers in Minnesota, the biology and injury of Papaipema species (*P. nitela*, *P. furcata*, and *P. cataphracta*) are considered. *P. furcata* was found in the nursery boring in the new growth of young ash trees. The work of the experimental garden and insectary is briefly considered, and a list of abstracts of publications dealing with insect pests of fruit, as reviewed in *Experiment Station Record* between January and October, 1908, are given. Appended are A Comparative Study of the External Anatomy of Plant Lice, by R. A. Vickery; descriptions of three new Hymenopterous parasites of the cabbage maggot (*Loxotropa pegomyiæ*, *Mesocrina pegomyiæ*, and *Aphæreta pegomyiæ*), by C. T. Brues; and descriptions of the larvæ and pupæ of *Papaipema nitela* and *P. cataphracta*, and of the larva of *P. furcata*, by H. J. Franklin.

Report of the entomologist, L. Bruner (*Ann. Rpt. Nebr. Bd. Agr., 1908, pp. 287–341, figs. 32*).—The first part of this report, on The Principal Insects Injurious to Agriculture during 1906–7 (pp. 287–306), is by M. H. Swenk. During the period under report there have been strong indications of a revival of chinch bug activities in several counties along the southern borders of the State. The false chinch bug (*Nysius angustatus*) was unusually abundant in northern Nebraska. The army worm was destructive to millet and oats in three counties in 1906. Cutworms attacked corn, wheat, alfalfa, potatoes, and tomato plants. The corn root worms were reported as a source of injury in Otoe and Hamilton counties in 1907. Other insects reported include the rose chafer, wheat insects, the clover-hay worm, blister beetles, cucurbit insects, granary pests, and the clover mite.

An account is given by H. S. Smith of the Aphids Injurious in Nebraska during 1906–7 (pp. 307–326). The spring grain aphis or green bug (*Toxoptera graminum*), which was the source of great injury in States to the south during 1907, was found in Nebraska on wheat and rye, but did not occasion any appreciable loss. This was probably due to the effective work of the parasite *Lysiphlebus tritici*. The English grain aphis (*Macrosiphum granaria*), which was found to be quite abundant over almost all territory where wheat was

grown, was mistaken by many during the spring of 1907 for *T. graminum*. It is present in Nebraska in some numbers every year, being the source of a more or less steady and continuous drain on the small grain crop. The European grain aphis (*Siphocoryne avenæ*) was found in some numbers associated with *T. graminum* and *M. granaria*. It has probably always been present to some extent in the State but has never become so numerous as to be a menace to small grain.

The root-infesting aphid (*Forda occidentalis*) was found in great abundance in almost all wheat fields examined while investigating the green bug. Some plants in these fields supported as high as 40 lice, although the field as a whole was not noticeably damaged, and usually a much smaller number was found upon the plants. It is always attended by a small brownish ant, the species of which has not yet been determined. A second root-infesting aphis (*Geoica* sp.) was found abundant in one locality in October, 1907.

The corn root aphis (*Aphis maidi-radicis*) was reported as doing considerable damage north of the Platte River. The corn leaf aphis (*A. maidis*) was frequently found upon broom corn, sorghum, and Indian corn. The cherry aphis (*Myzus cerasi*) did considerable damage to cherries and plums. The green peach aphis (*M. persicæ*) is fairly numerous upon peach trees in orchards of southeastern Nebraska. The woolly aphis has become very common in Nebraska. The boxelder aphis (*Chaitophorus negundinis*) has done considerable injury to boxelder trees. The melon aphis has become injurious to pickle growing in the State.

An account of The Botflies Affecting Live Stock in Nebraska is given by M. H. Swenk (pp. 327–341). Owing to persistent and emphatic complaints from farmers and stock raisers, detailing losses from injured hides, shortened milk supply, etc., due to the ravages of the ox warble fly (*Hypoderma lineata*), a circular was sent out to prominent cattle men outlining the known habits and life history of the insect and asking questions in order to bring out such personal observations as had been made. The general concensus of opinion as reflected in over 100 replies has been summed up by the author and is in part as follows:

"The ox warble fly is present over the entire State, and while eastwardly it seems to be only fairly common, in western Nebraska it is abundant and of recent years has been decidedly on the increase. On the majority of ranches from 50 to 75 per cent of the cattle are affected. . . . The first grubs appear as early as September, when a few very small ones are discernible upon close inspection, more appearing during October, November, and December, and all reaching very obvious size by New Year's day, from which time on they are conspicuous. . . .

"As a rule there is no dockage on animals poor in flesh because of warble attack, but sometimes 5 to 10 per cent of the value is docked for this cause. Warbled hides, however, are always rated second class, which is equivalent to a dockage of one-third. Where only a few grubs are present the interference with fattening is too slight for consideration, but badly infested animals fatten only with great difficulty or not at all, require 10 per cent more feed, and are usually about a month behind uninfested individuals, an interference in all of perhaps 25 to 35 per cent. Where the two are equally accessible to the flies, farm and range cattle seem to be equally infested, but westwardly the range cattle seem to have much the worst of it. . . .

"The eggs are deposited on the lower portions of the limbs, usually the hind legs about the hoofs. The cattle are everywhere afraid of the flies and try to escape from them by running or seeking water, where the fly will not follow. . . . Very few had found evidences of the grub elsewhere than in the back of the animal. . . .

"The only remedies generally practiced are the squeezing out of the grubs or killing them by putting some substance, such as turpentine, carbolated oil, axle grease, etc., into their breathing holes in the animal's back. Dipping, being practiced in the fall and early spring before the breathing holes are well formed, is considered usually ineffectual against warbles. Late spring dipping has, however, apparently proved helpful in some cases. Actual experimentive tests, which it has as yet been impracticable to make, seem necessary for the complete determination of this point."

The common horse botfly (*Gastrophilus equi*) is found in all sections of the State, and the chin botfly (*G. nasalis*) of the horse was almost equally prevalent. The red-tailed botfly (*G. hæmorrhoidalis*) is said to be comparatively rare, but the sheep botfly (*Œstrus ovis*) is found nearly everywhere that sheep are kept. An account is given of the life history of these flies. Other American botflies briefly considered include species of Cephenomyia, which infest the various members of the deer family, and species of Cuterebra, which parasitize rodents, etc.

[Insect pests], M. H. Swenk, H. S. Smith, and L. Bruner (*Insect Pest and Plant Disease Bur. Nebr., Circs. 7, pp. 4, fig. 1; 8, pp. 4, figs. 2; 9, pp. 4, figs. 3; 10, pp. 4, fig. 1*).—These circulars take up, respectively, the strawberry leaf-roller (*Ancylis comptana*), potato stalk borer (*Trichobaris trinotata*), corn-ear worm (*Heliothis obsoleta*), and the house fly.

Observations of the season [in Ohio], H. A. Gossard (*Ann. Rpt. Ohio Bd. Agr., 62 (1907), pp. 904–911*).—*Scolytus rugulosus* is said to be attacking and threatening the destruction of orchards in some districts of the State. In connection with the codling moth experiments here briefly considered, it is stated that the ordinary Vermorel nozzles with medium caps give the best spray at 100 lbs. pressure. The variegated cutworm (*Peridroma saucia*) was quite destructive in some localities, while the radish maggot was not so destructive as in former years. The grape-berry worm, while not so destructive in the grape region along the lakes, became more injurious in the interior sections. The greenhouse white fly has become established in many greenhouses. A Millipede became very numerous in the station greenhouse and killed a few cucumbers. The raspberry flower beetle (*Byturus unicolor*) was quite destructive in one county.

The army worm, H. Garman (*Kentucky Sta. Bul. 137, pp. 431–449, pls. 6, figs. 5*).—*Heliophila unipuncta* is said to attract attention in Kentucky from time to time because of its injury to timothy, millet, and other grasses. In 1908, complaints were frequently received from farmers living in the bluegrass region of the State. Bluegrass, corn, and even red clover were gnawed, while alsike clover, in one case noted, was rather badly injured. *Alsine octoflora* was stripped of its leaves wherever it occurred in a field of clover. White top (*Erigeron annuus*) was a favorite food plant.

Brief notes are presented on the crops attacked by army worms, localities in which the worms gather head, and the weather most favorable to their development. Technical descriptions of the stages and notes on the early literature of the army worm are also given.

At least 3 broods develop during the season in the State. The moths of the second brood were observed from June 22 to July 10, those of the third brood emerged on August 5, and a fourth brood emerged on September 18.

The tachinids *Winthemia 4-pustulata* and *Phorocera leucaniæ*, and the brachonid *Apanteles militaris* are the parasites found to attack it in Kentucky. The tachinid *Belvoisia unifasciata* also occurs in the State, but has not as yet been found to be a parasite of the army worm. Several species of the digger wasps have been found to destroy the army worm. Observations on the methods of

attack, etc., in the case of *Ammophila pictipennis* are here described. During the wet season by far the most destructive enemy of the army worm is said to be a species of Empusa, probably *E. virescens*, one of the parasitic fungi. A Micrococcus which is easily cultivated on nutrient gelatin also appeared to destroy the worms during spells of excessively hot weather.

The treatment found most effective is destruction of the breeding places. After they begin to march, plowing trenches about infested land causes them to accumulate in these and permits their destruction with coal oil and fire.

Soil sterilizing; Bordeaux mixture and poisons for tobacco seed beds, W. T. HORNE (*Estac. Cent. Agron. Cuba Circ. 30, English Ed., pp. 11*).—Damping off, due to a Rhizoctonia, is said to be a well-known disease of tobacco in Cuba. The principal insects which injure the tobacco seed beds are cutworms (*Feltia annexa* and other species), climbing cutworms (*Prodenia* sp.), the leaf folder (*Micromima olivia*), and the flea beetle (*Epitrix parvula*).

Hot water is considered the most practical means for sterilizing tobacco seed beds so far tried in Cuba. Bordeaux mixture, when properly prepared and applied in time, has thus far proved an effective remedy for the damping off of these beds. It is also a valuable repellant for insects attacking the beds, and if used with poisoned baits will probably be effective. The baits are the most valuable means of protecting the beds from insect injuries and should be used whether insects are seen or not. Where these remedies are not effective a spray of arsenate of lead is recommended.

Sixth annual report of the chief inspector of nurseries and orchards, W. E. EVANS, Jr. (*Ann. Rpt. Ohio Bd. Agr., 62 (1907), pp. 589–614*).—This is a report of the inspection work for the year 1907.

The damage done by the oyster-shell scale is said to have been very marked, especially in the lake region on poplars, maples, etc. On account of the injury by this pest the city of Cleveland has prohibiited the setting of Carolina poplars within the city bounds. Ravages of the white-marked tussock moth were seen all over the State, and the apple datana was a troublesome pest to nurserymen.

[Report of the] department of entomology, E. P. TAYLOR (*Missouri Fruit Sta. Rpt. 1907–8, pp. 10–15, pls. 3*).—A large part of the insect work has been directed against the San José scale. In a single township as a result of spraying demonstrations by the station and the influence of a few progressive orchardists, 20,000 fruit trees and shrubs were sprayed by orchardists for the San José scale in the fall of 1907 and spring of 1908 with excellent results, where previously practically nothing had been done to check the spreading of the scale.

Experiments were conducted against the codling moth and curculio infesting the apple in perfecting a scheme of spraying which would effectually hold both under control. Studies of the life history and habits have also been made of a large number of the principal insect enemies of the orchard.

Report of the past year's work of the State board of entomology, E. L. WORSHAM (*Ga. Bd. Ent. Bul. 27, pp. 70–80*).—The author briefly reports on the work of the year. This includes the inspection work, investigations on the San José scale and red-headed fungus (see below), and experiments with soluble oils (E. S. R., 21, p. 60). Brief notes on experiments with plum curculio are also reported, from which it is concluded that arsenical poisons have a decided tendency to reduce infestation from curculio.

Effect of spraying with lime-sulphur wash. Red-headed fungus as parasitic on San José scale, A. C. LEWIS (*Ga. Bd. Ent. Bul. 27, pp. 81–86*).—Brief notes are given on the effect of spraying with lime-sulphur wash.

The red-headed fungus (*Sphærostilbe coccophila*) is said to be parasitic on the gloomy scale (*Aspidiotus obscura*) in many sections of Georgia, but in only a few instances has it been found occurring on the San José scale. From the experiments here reported, in which attempts were made to transfer it to the San José scale, the author concludes that it does not increase fast enough in Georgia to be of much value.

Report of the investigation of the red scale and its injury to oranges in Spain, P. AYMES and L. TRABUT (*Bul. Agr. Algérie et Tunisie, 14 (1908), No. 9, pp. 215–225, figs. 6*).—This is the report of a commission appointed to investigate the red scale (*Chrysomphalus minor*), with a view to perfecting measures for preventing its introduction into Algiers.

This species is said to be a native of tropical Asia and also found in the Antilles, but only in countries bordering on the Mediterranean has it become a source of serious injury. The pest is said to have first been observed in Europe by Berlèse at Florence, Italy, in 1895. Since 1899 it has become the source of great injury in sections of Spain, particularly to the orange, which when badly attacked has ceased to be grown at a profit. At Barcelona the red scale was found on all green plants offered for sale in the markets, particularly upon palms, and it is concluded that this point is the center of its distribution in Spain and to the Balearic Isles. At Valence it was found in nearly all the orange groves, associated with *Lepidosaphes* (*Mytilaspis*) *gloveri* and *L. citricola*, two species known in Spain as "serpeta." *L. gloveri* is said to have destroyed the collection of oranges at the Valence Botanical Gardens.

The passage of regulations requiring the inspection of imported plants and fruits, particularly nondeciduous plants and oranges, is recommended.

In combating fruit-tree bark beetles, H. F. WILSON (*Ohio Sta. Circ. 89, pp. 4–6*).—*Phlœtribus liminaris* and *Scolytus rugulosus* are said to be the worst of these pests. The author briefly considers the nature and extent of their injury and methods of treatment. A more extended account by the author of *P. liminaris* has been previously noted (E. S. R., 20, p. 955).

The olive fly in Calabria, G. DEL GUERCIO (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 5 (1908), No. 1, pp. 18–63*).—This is an account of *Dacus oleæ*, its injury, and methods of combating it in the province of Calabria, Italy.

[A tea pest], T. PETCH (*Trop. Agr. and Mag. Ceylon Agr. Soc., 32 (1909), No. 1, p. 82*).—An examination of specimens has shown the so-called green bug (*Lecanium viride*) and not the Lantana bug (*Orthezia insignis*) to be the source of injury to tea plants in Ceylon.

The raspberry byturus (Byturus unicolor), W. H. GOODWIN (*Ohio Sta. Bul. 202, pp. 173–186, figs. 8*).—During the last two years this pest has been the source of almost a total loss of the red raspberry crop of a number of Ohio growers.

The adults feed upon the young leaves and buds of the raspberry. The larvæ develop in the head upon which the berry is borne causing the affected berries to ripen earlier and tending to make them small and unfit for market. While the injuries are severe, these are usually confined to small and somewhat local areas. It is considered probable that the pest has some insect enemies which in most cases hold it in check as it seems to disappear after a few years of severe injury. It has been previously reported as injurious in Canada, Minnesota, Michigan, New York, Massachusetts, and Ohio.

Experiments have demonstrated the efficiency of an arsenate of lead spray applied a few days before the beetles emerged from their pupal cells. This time varies in different seasons, but is usually about May 10 in northern Ohio. The spray may be applied most readily with a machine of the grape-sprayer type, but with 1 or 2 nozzles so attached that the spray is thrown directly

from above to the bushes. In this way the bushes will be entirely covered with spray and a great deal of labor saved besides enabling the grower to cover a large area of berries in a comparatively short time. In connection with the arsenic spray, thorough cultivation late in the fall close up around the bushes will destroy many of the pupæ or expose them to the freezes and thaws of winter, thereby causing their destruction.

"Spraying with kerosene emulsion is only to be recommended where the beetles are already very numerous, and the spraying with arsenate of lead has been deferred until after the beetles have appeared in large numbers; even then, the arsenate of lead will be fully as effective and last for a much longer period, but in extreme cases the two may be used together. Bordeaux may be added for fungus diseases and will help to hold the arsenate of lead on the foliage and fruit, making the spray slightly more efficient than if arsenate of lead were used alone."

The raspberry flower beetle (Byturus unicolor). H. A. Gossard (Ohio Sta. Circ. 89, pp. 4, fig. 1).—A brief account is given of this pest (see above).

Experiments with remedies for the grape Eudemis. L. Cayrus and J. Feytaud (*Progr. Agr. et Vit. (Ed. l'Est-Centre)*, 29 (1908), No. 29, pp. 77–87).—A report of experiments made in Gironde in 1907 with remedies for *Eudemis botrana*.

Nicotine and barium chlorid were tested, the best results being obtained from the latter. A 2 per cent solution of barium chlorid and molasses, applied in July before the eggs were deposited, decreased the amount of injury by 52 per cent. The toxic effect of this insecticide is said to be very high. Nicotine was also quite effective, as was the hand collection of the pest while in the pupal stage.

A new parasite of the grapevine pyralid. H. Stuart (Compt. Rend. Acad. Sci. [Paris], 147 (1908), No. 20, pp. 1241–1243).—The tachinid fly *Exorista vitripennis* is reported to have been so abundant during 1908 that it destroyed 90 per cent of the grapevine pyralids (*Conchylis ambiguella*). *Chiloe ambiguella*, previously reported as a parasite of this moth, and a species of Pteromalus are hyperparasites and prevent a more extensive parasitism by the tachinid. *Pimpla instigator*, a second species, is said to be a well-known parasite of this moth.

The pine-cone gall fly. M. Siebke (Zeitschr. Gesam. Forste u. Jagd, 6 (1908), No. 5, pp. 193–199, figs. 3).—The author presents an account of the life history and habits of *Thecodiplosis abietina*, with descriptions of the life stages.

The preparation and application of insecticides and fungicides. A. S. Hopkins (Farm. Coast. Agron. Pubs. Circ. 16, English Ed., pp. 41, figs. 29).—Formulas of insecticides and fungicides, with directions for their application, are given. Spraying machines and equipment are described and illustrated.

The biting of man by squirrel fleas. G. W. McCoy (Pub. Health and Mar. Hosp. Serv. U. S. Pub. Health Repts., 23 (1908), No. 46, p. 1577).—"The finding of several plague-infected ground squirrels in California, together with the belief that it is possible for man to be infected with plague from squirrels, prompted experiments to determine whether fleas from these rodents would bite man under experimental conditions.

"In the experiments the common California ground squirrel (*Citellus beecheyi*), the species in which plague infection has been found, was employed as a source for the fleas were collected and shipped. The fleas were then placed in large test tubes, 4 to 6 fleas in each tube. To feed them the tube was inverted over the forearm of a healthy man.

"For the first experiment 30 fleas (*Ceratophyllus acutus*), the majority of which were females, were applied 1 hour after they had been removed from

their natural host; only 2 fed. Twenty-four hours later but 1 fed. On the third day 4 of the 8 living fleas in 3 of the tubes fed well. On the sixth day only 12 of the 30 fleas were alive; none of these fed.

"In the second experiment 5 female fleas (*C. acutus*) were applied to the arm 4 days after they had been taken from the squirrel; none fed. Seven days later, 11 days after being collected, 1 flea was alive, and it fed vigorously.

"In the third experiment 4 female specimens of *Hoplopsyllus anomalus* were taken from a squirrel. All of these fed well on the fourth day after they were collected.

"These experiments prove that the common fleas of the ground squirrels in the vicinity of San Francisco will bite man under the experimental conditions noted. Whether man is actually infected from squirrels through their fleas is a matter that remains to be determined. The Indian Plague Commission believed that infection from the rat flea was probably through dejecta from the flea. In our experiments it was noted that even during the most prolonged feeding the fleas never ejected blood or feces from the anus."

The transmission of Trypanosoma lewisi by fleas and lice, G. H. F. Nuttall (*Parasitology, 1 (1908), No. 4, pp. 296–301; Proc. Cambridge Phil. Soc., 15 (1908), No. 1, p. 53*).—Experiments are here recorded which show that the two fleas, *Ceratophyllus fasciatus* and *Ctenopthalmus (Typhlopsylla) agyrtes*, and the louse, *Hæmatopinus spinulosus*, transmit *T. lewisi* from rat to rat. The ease with which infection took place through the agency of fleas suggests that they are probably the chief transmitters of the trypanosomes. In the first experiment with lice, 30 to 60 transmitted the trypanosome from diseased to healthy rats, while in the second experiment 14 lice failed to do so. No signs of any development of the trypanosome were observed in the bodies of the lice.

The author concludes that "since 3 distinct kinds of blood-sucking insects are capable of transmitting *T. lewisi* it appears doubtful that this flagellate is a parasite of the invertebrate 'host' in the sense claimed by Prowazek and other investigators."

A critical review of the relation of blood-sucking invertebrates to the life cycles of the trypanosomes of vertebrates, with a note on the occurrence of a species of Crithidia, C. ctenopthalmi, in the alimentary tract of Ctenopthalmus agyrtes, W. S. Patton and C. Strickland (*Parasitology, 1 (1908), No. 4, pp. 322–346, figs. 12*).—Following this critical review, the author describes *Crithidia ctenopthalmi*, a new species found infecting the alimentary tract of a flea (*Ctenopthalmus agyrtes*). Fifteen species are placed by the author in the genus Crithidia.

Crocodiles and tsetse flies, E. A. Minchin (*Nature [London], 79 (1909), No. 2051, p. 458*).—The author calls attention to the fact that while crocodiles may serve as hosts for trypanosomes there is no evidence whatever that they serve as an alternate host of *Trypanosoma gambiense* and that it is improbable that any reptile should play such a part. Reports by the press that the crocodile serves as such host for the causative agent of sleeping sickness appear to be due to a misinterpretation of Koch's report, in which he mentioned the finding of a trypanosome (not *T. gambiense*) in, and observing *Glossina palpalis* feed upon, the blood of this reptile.

Glossina palpalis (*Sleeping Sickness Bur. [London] Bul. 3, pp. 89–118, pl. 1*).—This is a summary of our knowledge of the life history, habits, enemies, and distribution of *G. palpalis*. The prophylaxis of sleeping sickness is also considered and a list is given of the papers consulted.

Entomological technique, M. Langeron (*Arch. Par., 12 (1908), No. 1, pp. 154–159, figs. 5*).—Directions are given for the dissection of the digestive tube and the salivary glands of mosquitoes.

On the structure of "Haller's organ" in the Ixodoidea, G. H. F. NUTTALL, W. F. COOPER, and L. E. ROBINSON (*Parasitology, 1 (1908), No. 3, pp. 238–242, pl. 1, fig. 1*).—The authors doubt that the function of Haller's organ is auditory. They consider the structure of the organ, the peculiar antenna-like movements of the first pair of legs, and the results of Lahille's experiments to be strongly in favor of the assumption that it is olfactory in function.

On the structure of the spiracles of a tick (Hæmaphysalis punctata), G. H. F. NUTTALL, W. F. COOPER, and L. E. ROBINSON (*Parasitology, 1 (1908), No. 4, pp. 347–351, pls. 3*).—An account of the structure of the stigmal plates of *H. punctata*.

On the presence of an anticoagulin in the salivary glands and intestines of Argas persicus, G. H. F. NUTTALL and C. STRICKLAND (*Parasitology, 1 (1908), No. 4, pp. 302–310; Proc. Cambridge Phil. Soc., 15 (1908), No. 1, p. 53*).—Attention is called to the work of Sabbatani published in 1898, which shows that the bodies of *Ixodes ricinus* contain substances which, when injected into dogs, prevent the coagulation of the blood and cause toxic symptoms, but do not cause hæmolysis. The following conclusions have been drawn from experiments made with *A. persicus* obtained from South Africa:

"There is clinical and experimental evidence that the bites of Argasidæ may be occasionally followed by toxic effects which are either local or general in character.

"This toxic effect may be due either to the peculiar susceptibility of the individual upon whom the bite has been inflicted or to the character of the substances injected into the wound by the tick in the act of biting. The cause of the toxic effect remains to be discovered. . . .

"The salivary glands and intestines of *A. persicus* contain anticoagulin but no hæmolysin.

"The amount of anticoagulin present in the salivary glands of *A. persicus* varies considerably. The amount contained in the glands of a single tick may delay the coagulation of 0.02 cc. of human blood for 45 to 95 minutes or indefinitely. The anticoagulin also acts on rabbit's blood.

"The movements of human leucocytes remain unaffected by exposure to emulsions of the salivary glands of *A. persicus*.

"Excepting the effects due to the presence of anticoagulins, it has not been established that the bodies or salivary glands of *A. persicus* contain toxic substances.

"The anticoagulin in the salivary glands of *A. persicus* is destroyed by an exposure of 10 minutes to a temperature of 80° C. Its action is partially abolished by a similar exposure to 55° C."

The Spirochætes: A review of some border-line organisms between animals and plants, H. B. FANTHAM (*Sci. Prog. Twentieth Cent., 3 (1908), No. 9, pp. 148–162, figs. 4*).—This is a brief review of our knowledge of the Spirochætes.

The chub and the Texas horn fly, R. L. MOODIE (*Amer. Nat., 43 (1909), No. 507, pp. 186–188, fig. 1*).—The author reports that in northwestern Nebraska the fish *Semotilus atromaculatus* meets cattle, as they enter streams to drink and jumps out of the water to catch the horn flies (*Hæmatobia serrata*).

External parasites on poultry in South Africa, W. A. HUMPHRIES (*Agr. Jour. Cape Good Hope, 34 (1909), No. 1, pp. 51–57*).—Four parasites of poultry in South Africa here considered are the red mite, fowl louse, sand flea, and tampan. The author considers it probable that more poultry are killed directly or indirectly by the ravages of parasites than from all other causes. The fowl tick or tampan is considered the most destructive parasite. Methods of treatment are discussed at length.

Mating experiments with bees, A. C. MILLER (*Rhode Island Sta. Rpt. 1908, pp. 306–311, fig. 1*).—The belief has long existed that control of the mating of the drones and queens must be secured before any very marked progress in the development and fixing of desirable traits will be possible. Mating takes place while the insects are flying, but when the males and females are confined either to a hive or to large inclosures they as a rule fail to mate. But few exceptions to the rule are known, several of which are here mentioned.

The author reports investigations conducted during 1907–8, in which a cloth house 9 ft. square and 9 ft. high was erected. Every factor which could be thought of is said to be embodied in the experiments, but so far without success. Just what the inclosure has to do with the mating is not known. That sight is not the primary means for finding or attraction seems evident, and the only remaining probability seems to be in sound. It is suggested that the instinct of the queen and drone to fly high has to do with the getting away from the noise of the horde of workers.

Silkworm rearing as a popular pursuit, T. A. KELEHER (*Guide to Nature, 1 (1908), No. 9, pp. 311–320, figs. 10*).—A popular account accompanied by illustrations.

FOODS—HUMAN NUTRITION.

The influence of sodium benzoate on the nutrition and health of man (*U. S. Dept. Agr. Rpt. 88, pp. 784, dgms. 8, charts 4*).—This volume contains the detailed reports of investigations made by three members of the Referee Board of Consulting Scientific Experts, appointed by President Roosevelt to study the influence of sodium benzoate on the nutrition and health of man. A bibliography of the more important work on benzoate of soda is appended. The main conclusions reached by the Referee Board are as follows:

"Sodium benzoate in small doses (under 0.5 gm. per day) mixed with the food is without deleterious or poisonous action and is not injurious to health.

"Sodium benzoate in large doses (up to 4 gm. per day) mixed with the food has not been found to exert any deleterious effect on the general health, nor to act as a poison in the general acceptation of the term. In some directions there were slight modifications in certain physiological processes, the exact significance of which modifications is not known.

"The admixture of sodium benzoate with food in small or large doses has not been found to injuriously affect or impair the quality or nutritive value of such food."

An experimental study of the influence of sodium benzoate on the nutrition and health of man, R. H. Chittenden (pp. 9–292).—Using 6 men as subjects the effects of sodium benzoate were studied, the experiment as a whole covering a period of 125 days. A period of 2 weeks, during which records were made of the subjects under normal conditions, was followed by a benzoate period of 2 months, in which each subject received per day 0.3 gm. of benzoate of soda, designated as the "small dose." Next followed an "after period" of 10 days, in which no benzoate was given, and then a 4 weeks' period with larger doses of benzoate of soda, ranging from 0.6 gm. per day at the beginning to 4 gm. per day at the close of the period. During this period of "large doses," covering 28 days, each subject took 53.2 gm. of benzoate. The investigation closed with an "after period" of 10 days.

Throughout the whole time data were collected regarding food consumption and composition, urine and feces, results of clinical and medical examinations, bacteriological studies of feces, blood count, etc., the results of the benzoate periods being compared with those obtained during the normal periods.

The general conclusions which were drawn from the investigations follow:

"Sodium benzoate, in small and large doses, up to a maximum of 4 gm. per day, is without disturbing influence upon the general health of the individual, so far as can be seen from clinical observations. There was no attendant loss of body weight; neither was there any disturbance of digestion, assimilation, or utilization of either the fat or protein food. Indeed, the subjects of our experiment showed a gain of weight and even an improved condition of digestion during the period of the experiment in which the action of sodium benzoate was tested.

"Again, there was no deleterious influence on the part of sodium benzoate upon the blood, either on the number of erythrocytes, leucocytes, or the hemoglobin content of the blood.

"Upon the less tangible processes of metabolism as indicated by the quantitative study of the urine, etc., there is no indication of any marked action. No changes of any special significance were to be noted during the period when sodium benzoate was fed even in large doses, aside from a slight effect on the reaction of the urine, so that the conclusion is obvious that sodium benzoate does not exert, in small or large doses, any pronounced influence upon the processes of metabolism or of nutrition.

"Sodium benzoate is without effect upon the production of nitrogen balance. Throughout our experiment a plus nitrogen balance was easily maintained, and in such fashion as to clearly indicate that sodium benzoate does not exert any harmful or disturbing influence.

"In our judgment, therefore, based on the character of the results obtained in this study of the action of sodium benzoate on the general health and nutrition of man, there is no suggestion of any pronounced effect whatever produced by the salt in such doses as we have employed. We are of the opinion that sodium benzoate, in small and large doses, up to a maximum of 4 gm. per day, is no more harmful or provocative of disturbance of the human organism than corresponding amounts of sodium chlorid or common salt.

"This conclusion, while based entirely upon the results of our investigation, is in close harmony with what is known regarding the occurrence of benzoyl-containing radicals in many natural products, which have long served as useful foods for mankind. As our results show, in harmony with well-known facts, the ordinary diet of man contains a sufficient amount of benzoic acid or kindred substances to give rise to appreciable quantities of hippuric acid in the urine. Further, huckleberries, cranberries, and other related fruits well recognized as noninjurious to health have in them amounts of benzoyl radicals sufficient to form quantities of hippuric acid in the urine larger than the small doses of sodium benzoate fed in our experiment; thus making it apparent that some natural foods at least contain quantities of benzoate, or related substances, in amount equal to what was fed in our daily dosage with sodium benzoate, and that the system is well inured to the presence of moderate quantities at least of this aromatic group.

"Finally, it may be added that the results of our experimental study make it evident that the admixture of sodium benzoate with food does not lead to any reduction in the quality or strength of such food; neither is the food injuriously affected thereby when the salt is added in small quantities or in large quantities, up to a maximum of 4 gm. per day. Were the contrary true, we should expect to find in our experimental results indications of either a disturbance of digestion, an inhibition of the normal power to digest and assimilate the food treated with sodium benzoate, together with a tendency toward the production of a minus nitrogen balance, with possible loss of body weight."

Investigations on the effects of sodium benzoate on the health and general metabolism of man, J. H. Long (pp. 293–563).—Six men students in normal health were the subjects of these investigations in which sodium benzoate was taken in experimental periods. In the first of 60 days' duration the daily dose was 0.3 gm. per person; in the second of 14 days' duration the daily dose was 0.6 gm.; and in the third period of 18 days' duration it was 1 gm. The diet throughout the whole test was ample, the men following their own tastes and desires in so far as possible. The amount of food consumed and the nitrogen and ether extract content were recorded together with the calculated fuel value in certain cases. Detailed studies were made of the urine and feces.

In his summary of the results obtained the author states that in the chemical studies of the urine and feces it was not found that there was any change in the normal metabolism attributable to the action of benzoate of soda. "There was no alteration in the distribution of the nitrogen of the urinary constituents, and no decrease in the utilization of the protein or fat of the food." So far as could be judged by the various special tests made, there were no alterations in the qualitative composition of the urine.

"In the bacteriological and other tests carried out in the feces, which were extended to a considerable length, no essential change from the beginning of the fore period to the end of the high preservative period was discovered. There were fluctuations, but they were not systematic, and varied with the individuals rather than with the dosage. It is fair to conclude that the action of the benzoate, in the amounts used, on the intestinal activities or on the characteristic flora must be, at most, extremely slight.

"The prolonged clinical observations are intended to show clearly the actual conditions of the men from day to day. . . . [The author considers them] of equal importance with the chemical tests made, for the purpose of this inquiry. But one conclusion may be drawn from them, and that is that the health of the men has suffered no impairment through the use of the benzoate in the period of the observation. . . . [The author believes], further, that the period is long enough to show change were it likely to occur.

"In conclusion it must be said, then, that the experience in our laboratory justifies the statement that the modern addition of sodium benzoate to our food, up to at least 1 gm. daily, does not give rise to any abnormal conditions in the subject, or lead to any changes in metabolism which may be detected with the means at our command.

"It follows, further, from the same observations, that such addition of benzoate to the food does not lower its value by robbing it of any element, by diminishing its digestibility, or by introducing a factor which modifies in any discoverable way the normal metabolism. The quality or strength of the food is not lowered or injuriously affected through the presence of the preservative, and this is true for large quantities as well as for small, since the amounts of preservative used in our experiments must all be considered large from the standpoint of actual use."

The action of sodium benzoate on the human body, C. A. Herter (pp. 565–761).—The investigations which were made with 4 subjects included a fore period, a low benzoate period, a high benzoate period, and an after period, in which the author studied particularly the physiological body processes. During the low benzoate period the daily dose of sodium benzoate was 0.3 gm. During the high benzoate period it ranged from 0.6 gm. to 6 gm. per person per day.

The discussions include general medical notes, analytical data regarding the urine and feces, fats and fat balance, the results of general and special urinary examinations, and of chemical and bacteriological examinations of the feces, clinical data, and similar topics.

According to the author's summary, the following conclusions may be drawn regarding the action of small doses of sodium benzoate:

"No action from small doses of sodium benzoate was detectable by the methods used in this investigation in respect to the following physiological features: The general health of the subject as indicated by subjective and objective signs; the composition of the urine (with one exception, viz, the physiological effect on the hippuric acid excretion); the composition of the feces; the absorption of fats and the fat balance; the character of the bacteria of the intestinal tract; the weight of the body; the hemoglobin of the blood; the red blood cells; and the white blood cells.

"The observed rise in hippuric acid of the urine was such as was to be expected from the well-known metabolism of benzoic acid in the animal organism. . . .

"The failure to detect significant departures from any physiological processes may safely be taken as a practical certainty that none of the experimental subjects who submitted themselves to our investigation derived any injurious effects therefrom. The fact that the composite curves made from our subjects to indicate the body weight and the hemoglobin percentage show a rise both in weight and in hemoglobin for the entire benzoate experiment (low benzoate period and high benzoate period) is a practical and obvious confirmation of this conclusion derived from two important indices of physiological well being or health."

As regards the action of large doses of benzoate of soda, "it may be stated that no definite physiological consequences of large doses of sodium benzoate were detectable by the methods employed in this investigation except in the following instances:

"There was a considerable or large rise in the hippuric acid excretion, such as would be expected from the doses of sodium benzoate ingested. The significance of this rise has been discussed at sufficient length in the preceding section dealing with small doses of sodium benzoate.

"There was an increase of the indican of the urine, not great but unmistakable. This rise, discernible in all 4 subjects, seems attributable to an action of the sodium benzoate, as other known factors in the experimental conditions fail to satisfactorily account for it. It is perhaps attributable to a slight irritant action on the gastro-enteric tract, so altering the secretions or bacteria (or both) as to favor intestinal putrefaction.

"There was a depression of the gas-forming function of the mixed fecal bacteria.

"There was a moderate but apparently unmistakable rise in the proportion of coccal bacteria observed in the fermentation tube sediment derived from the inoculation of the mixed fecal flora. The precise significance of this phenomenon and of the depression in gas production noted . . . [above] is not known, but both conditions are frequently associated with slight or pronounced inflammatory affections of the gastro-enteric tract.

"There was a distinct rise in the free hydrochloric acid of the gastric juice."

Is food containing benzoates injurious to health? E. E. Smith (*Med. Rec. [N. Y.], 75 (1909), No. 1, pp. 16–18*).—A discussion of investigations previously noted (E. S. R., 20, p. 464), with the conclusions from which the author does not agree.

The effects on health of long-continued small doses of sodium sulphite, K. B. Lehmann and A. Treutlein (*Arch. Hyg., 68 (1909), No. 4, pp. 303–318*).—From experiments with cats and dogs the conclusion was reached that medium doses of sodium sulphite do not produce noticeable effects on the health of the animals even when continued for 200 days. The authors point out that it

would not be fair to conclude from these results that sodium sulphite should be used in preserving meat, since if it is added, spoiled meat can be used and inferior meat given the appearance of meat of better quality.

The effect of some so-called preservative salts on chopped meat, K. E. BOEHNCKE (*Hyg. Rundschau, 19 (1909), No. 8, pp. 475–486*).—Experiments with 3 commercial preservative salts did not give satisfactory results. To secure preservation comparable with that obtained by the use of ice large quantities of the preservative salts were required.

The effect of cold storage upon domestic fowls, W. G. BISSELL (*Buffalo [Dept. Health], 1909, pp. 4; abs. in Buffalo [Dept. Health] Sanit. Bul., n. ser., 2 (1909), No. 3, pp. 1, 2*).—The turkeys used in this investigation were purchased alive and kept under observation for several days, then killed, dressed, and placed in cold storage for a year under what the author considers the most favorable circumstances. With a view to comparing the effect upon quality, half of the turkeys were stored drawn and half undrawn. At intervals the birds were removed from storage for study and cultures were made of the flesh and sections of the tissue were examined to ascertain whether during the period of storage bacterial migration took place, and if so, when it occurred, the results being compared with data obtained from similar examinations made before storage.

A number of tests were also made of the stored birds in which their quality when cooked was judged by different individuals.

According to the author's conclusions, no changes making the food detrimental to health take place when turkeys, and presumably other domestic fowls and game, are kept a year in cold storage under proper conditions, provided the material is in perfectly fresh condition when stored, and is especially prepared for storage. The flavor of turkeys kept in cold storage, and probably of other domestic fowls and game also, differs from that of the fresh birds of equal quality, being less sweet and relatively less pronounced.

When the turkeys are undrawn, "there is a tendency for the odor, and undoubtedly the taste, of the material contained in the intestines to permeate the adjacent tissues at the time of the thawing-out process. There is also the possibility of the bacteria contained in the intestinal contents to migrate through the abdominal tissues at the time of the thawing-out process. It is the opinion of the investigator that all domestic fowls submitted to cold storage should be drawn and should be properly killed and otherwise prepared . . . [and packed] with the express intention of being placed in cold storage, and that domestic fowls, unless so prepared, should not be allowed to go into cold storage, and that regulations suitable to the enforcement of such procedure should become a health administrative measure. Changes in turkeys, and probably the same is true with other domestic fowls and game, do not take place during the actual time of the proper application of cold storage, but occur before being placed under the influence of this process for food preservation, at the time of the thawing-out process, and at times subsequent thereto. Material in any state of decomposition is in no way improved by the application of cold storage, and its application will only tend to retard the destructive process, or cause it to be arrested at the point reached at the time of being subjected to cold storage.

"In the case of turkeys, and probably the same applies to other domestic fowls and game, cold storage is the only possible method by which this class of food material can be preserved. Food of this kind is largely of seasonal production, which seasons are relatively of short duration. If cold storage was not resorted to, there would be months of the year when turkeys, and probably the same applies to other domestic fowls and game, could not be obtained

for food. As a result of the facts determined by this investigation it would seem that under the proper regulation, . . . cold storage can be safely employed for this class of food preservation."

Tests on cold storage of poultry (*Ice and Refrig., 36 (1909), No. 5, p. 260*).—A reprint of the greater part of the article noted above.

The cold storage industry in Uruguay, D. E. SALMON (*7. Cong. Rural Am. [Uruguay], 1908, pp. 89–98*).—A discussion of statistical and other data.

Concerning the supposed connection between protein coagulation and the heat shortening of animal tissues, E. B. MEIGS (*Amer. Jour. Physiol., 24 (1909), No. 1, pp. 178–186, dgms. 6*).—From his experimental data the author concludes that the facts reported "do not, of course, preclude the possibility that the precipitation of protein from its solutions and the shrinkage of animal tissues under the influence of heat may be fundamentally more or less similar processes. They do show, however, that the shortening of striated muscle at temperatures above 50° is independent of the coagulation of myogen, and they make it seem probable that the heat shortening of most animal tissues is dependent, not on the aggregation of the particles of coagulable protein, but on some other process."

The autolysis of foods, A. MAIER (*Arch. Verdauungskrank., 15 (1909), pp. 29–41; abs. in Biochem. Zentbl., 8 (1909), No. 10, pp. 525, 526*).—These experiments on auto-digestion were made with meat, arrowroot, potato and wheat flour.

The factors which influence the composition of wheat, S. CSERHÁTI (*Kisérlet. Közlem., 11 (1908), No. 3, pp. 253–275; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 6, p. 328*).—In this paper the effect of climate, soil, fertilizer, and other conditions is discussed with reference to the composition of wheat, the weight of the grain, and similar topics.

The milling and baking properties of wheats of large yield, J. B. MARTIN (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 2, pp. 147–157; Jour. Agr. Prat., n. ser., 17 (1909), No. 16, pp. 502, 503*).—Milling tests, analyses, and baking tests led the author to conclude that the wheats under consideration are not inferior to older varieties with reference to milling properties, gluten content, or bread making qualities.

Martin's experiments on the nutritive value of wheats of large yield, E. SCHRIBAUX (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 18, pp. 536–540; Bul. Soc. Nat. Agr. France, 69 (1909), No. 4, pp. 350–359*).—See above.

Change in the composition of unground cereals during storage, S. LEAVITT and J. A. LE CLERC (*Jour. Indus. and Engin. Chem., 1 (1909), No. 5, pp. 299–302*).—From analytical studies extending over two years the authors conclude that "there is more or less change in all cereals under the influence of aging. These changes seem to take place whether the cereal is stored in the whole grain or is ground to a fine powder before storage. In the latter case, however, the changes take place more rapidly. We notice that the principal products which seem most susceptible to change are first the sugars and then the 70 per cent alcohol-soluble proteins, the 5 per cent K_2SO_4-soluble proteins and the water-soluble proteins coagulated by so-called Stutzer's reagent.

"Corn, barley, and oats are most subject to loss of sugar during aging. On the other hand, many samples of wheat show a slight loss the first year and then quite a rapid gain in the sugar content, in some cases a gain of 24 per cent of the total sugar present being noted at the end of two years.

"Considering the grains most susceptible to protein change we have in the order given corn and to a very slight degree barley, rye, wheat, and oats. As we should expect, there seems to be no change in the mineral constituents of

the grain or in the total nitrogen, the weight per bushel and the weight per 1,000 kernels remaining practically constant."

White v. brown bread, W. JAGO (*Millers' Gaz., 33 (1909), No. 2, pp. 14, 15*).—The author concludes, from a summary of data including the results of analyses of bread from ordinary flour and whole-wheat flour, that "in nutritive value, . . . white bread is fully able to hold its own."

Molasses: Its definition and formation, H. C. PRINSEN GEERLIGS (*Internat. Sugar. Jour., 10 (1908), Nos. 113, pp. 227–235; 114, pp. 284–292*).—From the analytical and other data summarized the author defines molasses as "a hydrated combination between sugars and salts, which can not be broken up by evaporation, and therefore can not give off sugar in a crystallized form."

Bog berries and their identification in preserved bilberries, C. GRIEBEL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 2, pp. 65–73, figs. 2*).—Histological studies of bog berries (*Vaccinium oxycoccos*) and their seeds are reported and discussed with reference to their detection when used as an adulterant in red bilberries (*Vitis idaca*).

Gironde red wines of 1907, P. CARLES (*Proc. Verb. Soc. Sci. Phys. et Nat. Bordeaux, 1907–8, pp. 111–118*).—Analytical data are presented and discussed.

Roman wine, F. MAGGIACOMO and G. CORSO (*Staz. Sper. Agr. Ital., 41 (1908), No. 9–11, pp. 717–724*).—A number of analyses of Roman wines of the vintage of 1907 are reported.

The carbon dioxid content of artificial mineral water, K. KISSKALT (*Hyg. Rundschau, 18 (1908), No. 14, pp. 817–820*).—It was found that the carbon dioxid content of charged mineral water varied with the method followed in opening the bottle and in pouring out the contents. In the analyses reported the carbon dioxid ranged from 2.896 to 3.925 liters per liter of water. The experimental data did not substantiate the popular belief that placing a glass rod or some similar article in the glass aids materially in removing carbon dioxid from the water.

The author's studies led him to conclude that the eructation of gas and other unpleasant symptoms experienced after drinking charged water are to be ascribed to the amount of material in the stomach rather than to the carbon dioxid.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 66–67, pp. 5; 68, pp. 6*).—The subjects included are the misbranding and adulteration of stock feed, the misbranding of butter, and the misbranding of whisky.

The organization of the food control work in the United States of America, C. A. NEUFELD (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 4, pp. 197–202*).—An article descriptive of the food and drug inspection work in the United States.

Ohio general food and drug law as amended March 12, 1909 (*Columbus: Dairy and Food Comr., 1909, pp. 11*).—The text of the amended State food and drug law is given.

The daily meals of school children, CAROLINE L. HUNT (*Bur. of Ed. [U. S.] Bul. 3, 1909, pp. 62, pls. 3, dgm. 1*).—In this monograph which summarizes the results of the author's own experience and the investigations and experience of others the questions discussed include the serving of food in schools, the cultural possibilities of the noon hour in rural schools, lunches for school children, the preparation of lunches by domestic science classes, high school lunch rooms, food for children of different ages, the underfed child, plans which have been followed in the United States and other countries to remedy underfeeding, and similar topics. The author makes many suggestions for meeting the problem of the feeding of school children from a practical, an educational, and a scientific standpoint.

As is pointed out, the proper feeding of school children "involves not only questions of hygiene but of educational policy and social economy, questions which are only beginning to receive serious consideration. . . .

"It seems obvious that there are two problems before us, alike in many respects but differing in others. One of these, the problem of the underfed child, is a problem chiefly of poverty; the other, that of the feeding of school children, is a problem chiefly of education."

A full index is provided and a classified bibliography.

The feeding of school children, LILLIAN D. WAHL (*Charities and Commons, 20 (1908), No. 11, pp. 371–374*).—Some data are given regarding the attempts made to supply food to children in some of the New York public schools.

Experiments of former years and of the present time in the author's opinion have shown "the futility and mistake of meeting the needs of the underfed or improperly fed school child by free lunch rooms or kitchens on the basis of charity. The need of the school lunch [for the sale of food under proper supervision] has again been recognized. . . . Estimated by the most material measurement, it is a comparatively small investment of public thought and public money for a large result."

Feeding the school children (*Charities and Commons, 20 (1908), No. 12, pp. 381, 382*).—A discussion of the situation in New York City with reference to the above article.

The school children's lunch room (*Charities and Commons, 20 (1908), No. 12, pp. 400–402*).—A discussion of the school lunch room problem for New York City.

The fireless cooker, CAROLINE B. LOVEWELL, FRANCIS D. WHITTEMORE and HANNAH W. LYON (*Topeka, 1908, pp. 211, figs. 11*).—Directions are given for making fireless cookers of different sorts and for using these devices in the preparation of single dishes and meals. The recipes included in the volume are arranged especially for use with the fireless cooker. On the basis of experience and study of the subject, the authors believe that fireless cookers are an important labor saving device and may be used in a variety of ways to lessen the housekeeper's burdens.

Camping and camp cooking, F. A. BATES (*Boston, 1909, pp. 116, figs. 9*).—Equipment, amount of provisions and other materials, cooking utensils, and other matters connected with camp life and camp cookery are discussed, and recipes are given for the preparation of a considerable number of dishes.

The metabolic function of certain glands, E. DIESING (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 6, pp. 209–216*).—The author discusses the function of certain glands, particularly with reference to the metabolism of mineral constituents (iodin, arsenic, iron, sulphur, and calcium), and other metabolic functions, and believes that they are especially important in the mineral metabolism of the body. In his discussion he has arranged in schematic form the data presented, under the headings Assimilation, Regulation of Total Quantity, Regulation of Central and Peripheral Growth, Regulation of Oxidation and Reduction, and Excretion.

The glands concerned in metabolism, AUFRECHT and E. DIESING (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 10, pp. 369–371*).—Continuing the discussion referred to above, on the relation of certain glands to mineral metabolism, the authors conclude from their investigations that the suprarenal capsule contains a substance which is to be regarded as the sulphur regulating component of the body. Like other glandular constituents regulating mineral metabolism which they state can be isolated from specific glands, this body is a pigment. According to the authors' experiments, this suprarenal body

increased blood pressure, reduced the hemoglobin content of the blood, and had only a slightly toxic effect.

Experiments on absorption in the large intestine, F. KELLER (*Experimentelle Beiträge zur Frage Resorption im Dickdarm. Inaug. Diss., Univ. Breslau, 1909, pp. 39*).—In the experimental data reported the resorption of undigested protein (sodium casein) and egg albumin was not noted in the large intestine in the case of dogs or man. Peptonized protein was absorbed but in much smaller amount than in the small intestine. Grape sugar and cane sugar and also very small amounts of 0.5–1 per cent solutions of sodium bicarbonate were absorbed in the large intestine.

Experiments on the effects of overfeeding and muscular work and upon resorption in the intestine, HEINSHEIMER (*Med. Klinik. 1908, No. 50, pp. 1915, 1916; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. scr., 4 (1909), No. 6, p. 229*).—From the experimental data the conclusion is drawn that the digestive power of the intestine was in no way diminished by the enforced muscular work. It appeared rather that muscular work increased digestion, particularly that of fat when excessive quantities were taken.

Fat resorption by man and animals under pathological conditions, M. ADLER (*Ztschr. Klin. Med., 66 (1908), p. 302; abs. in Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. scr., 4 (1909), No. 6, p. 229*).—Under pathological conditions cooked bacon was more readily absorbed in the intestine than raw.

Cellulose and hemicellulose digestion and the nutritive value of these substances to man, H. LOHRISCH (*Ztschr. Expt. Path. u. Ther., 5 (1909), No. 3, pp. 478–539*).—The author reports and discusses extended investigations of the digestion and nutritive value of cellulose and hemicellulose.

These substances, he points out, are closely related chemically but usually can be clearly distinguished by means of their chemical properties. As regards physiological value, they show no marked differences. Under normal conditions about 50 per cent of the cellulose and hemicellulose taken in the food is digested by man, but in cases of chronic constipation as much as 70 or 80 per cent is digested. It is possible for a man to digest much larger quantities of hemicellulose than cellulose.

The manner of digestion of hemicellulose and cellulose by man is the same as in the case of starch, these substances being changed in the intestine into their respective sugars, but the transformation into sugar and resorption take place more slowly than in the case of starch. The resorbed material is completely burned in the body and therefore protects protein and fat from combustion. There is no doubt that both hemicellulose and cellulose can be used for glycogen formation if a sufficient amount is resorbed. The production in the small intestine of volatile fatty acids from cellulose and hemicellulose was not noted, but the possibility of the formation of a small amount in the large intestine is pointed out.

Cellulose and hemicellulose the author considers harmless for diabetics, even in severe cases, and suggests that they use particularly hemicellulose as a principal substitute for the more easily digested carbohydrates.

A bibliography is appended to the report.

Phosphorus compounds as brain foods, W. KOCH (*Jour. Amer. Med. Assoc., 52 (1909), No. 18, pp. 1381–1383*).—This is a general discussion of the subject, on the basis of the author's studies of the composition of normal and diseased brains and other data, which led to the following conclusions:

"There is no evidence of any need to supply phosphorus to the brain in conditions of exhaustion, as a lack of that element has not yet been demonstrated. The actual amount lost in the exhaustion of general paralysis can not, of course,

be replaced on account of the inability of the central nervous system to regenerate.

"The phosphorus required for the growth of the brain is amply supplied by the phosphorus of our daily diet. If desired, the addition of phosphorus-rich foods, such as eggs, sweetbreads (pancreas), liver, and some meats, can be made to meet further requirements, and will far exceed in amount the phosphorus obtained in less natural form from the prescribed doses of any of the various drugs in commercial use. The use of such foods is, however, limited by their richness and their tendency, on account of their rich fat content, to interfere with gastric digestion.

"As far as the nervous system is concerned, the addition to the diet of commercial phosphorus compounds, such as hypophosphites, glycerophospinate, phytin, lecithin, etc., is to be discouraged because, in the first place, there is no conclusive evidence that they have any effect on the growth of the brain, and, second, the amount usually recommended means only a very insignificant addition to the amount of phosphorus (even in its special forms such as lecithin) taken with the daily food."

Acid intoxication, J. B. NICHOLS (*Washington Med. Ann., 7 (1908), No. 2, pp. 133–147*).—It was the author's purpose in this discussion of the subject "not only to present an outline of existing knowledge concerning acid intoxication, but also to call attention to the fact that the condition, even in marked and serious form, occurs much more frequently than is generally realized."

On the composition of dilute renal excretions, A. B. MACALLUM and C. C. BENSON (*Jour. Biol. Chem., 6 (1909), No. 2, pp. 87–104*).—Quotations from the authors' summary follow:

"The elimination of water is not due to filtration, but to the physiological activity of the renal membranes involved in the elimination.

"The removal of potassium salts and of chlorids from the blood by the kidneys is not due to filtration, but to forces which may be termed 'secretory,' that is, it is caused by an activity which is apparently selective, or differential, but which may be explained as due to differences in solubility of the different inorganic constituents of the plasma in the secreting membrane. The solubility, either relatively, or absolutely, or both relatively and absolutely, would be altered by changes in the constitution of the membrane brought about by the action on it of unusual constituents of the plasma or of constituents of unusual proportions."

Factors regulating the creatinin output in man, P. A. LEVENE and L. KRISTELLER (*Amer. Jour. Physiol., 24 (1909), No. 1, pp. 45–65*).—The following statements are quoted from the deductions drawn from the experimental data reported:

"From the results of our experiments one also receives the impression that the formation of creatin and creatinin represents two phases in the catabolism of but one substance, as in most observations a fall in the creatinin output was associated with an increased creatin elimination, and a high protein diet (creatin-free), in some patients, caused a rise in the output of both substances.

"The constant value of the creatinin output in normal men is conditioned by the high velocity of creatin combustion in health. Thus, the creatinin of the urine normally represents only a small fraction of the creatin formed in the organism. The condition might be analogous to the uric acid output in the dog, in which the power of oxidation of purin derivatives is exceedingly high. The uric acid content of dog's urine is minimal, and, being so, appears to be practically constant. However, as soon as the liver is excluded from circulation and the intensity of purin oxidation is diminished, the uric acid output in the dog begins to show marked variations influenced by the character

of the food. In a similar manner the normal creatinin output in conditions of high muscular activity may be explained by the assumption of a higher intensity in the power of the organism to oxidize creatin, although the creatin production in these conditions probably exceeds the normal limits."

The influence of protein and carbohydrate consumption upon metabolism, A. GIGON (*Skand. Arch. Physiol., 21 (1909), No. 6, pp. 351–367*).—From the respiratory quotient experiments reported it appears that taking either sugar or protein caused a temporary rise in the excretion of carbon dioxid. If the amount was taken in several like portions at regular intervals, the increased carbon dioxid excretion remained constant for several hours. The excretion of nitrogen and phosphoric acid in the urine was not affected by a regulated consumption of sugar, and there is no reason for supposing that with respect to metabolism sugar replaced protein.

The increased respiratory exchange after food is taken, the author considers, is connected entirely with the digestive processes, but he does not believe that the term "work of digestion" is applicable in such cases, since one can hardly believe that the muscular work of the intestinal region is sufficient to explain the observed increase in respiratory quotient after food is taken. It is also hard to understand why dextrose solution should cause a marked increase in the work of digestion. From his investigations he concludes that it is proper to speak of the "specific dynamic effect" of certain foodstuffs.

The effect of muscular work upon the sugar content of the blood, F. REACH (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 7, pp. 241, 242*).—From a discussion of experimental data not yet reported in full, the author concludes that neither the lowering of the sugar of the blood owing to muscular work, nor the stimulation of the muscles and liver, is the cause of the rush of sugar to the blood. He considers rather that the passage of sugar from places of storage to the blood is due to the action of hormones.

The influence of training upon carbon dioxid excretion when isometric muscular work is performed, A. F. HELLSTEN (*Skand. Arch. Physiol., 22 (1909), No. 1, pp. 1–22*).—In general the author found that as a result of training the excretion of carbon dioxid was diminished when muscular work was performed under the experimental conditions. The generally observed fact that when the same amount of muscular work is performed an untrained person is more exhausted than one in training, according to the author, is not a subjective condition, but is due to the greater excretion of carbon dioxid, or in other words, to a greater expenditure of muscular work.

In connection with his observations studies were made of body temperature and it was found that it was decidedly increased by the work performed.

Metabolism in man with greatly diminished lung area, T. M. CARPENTER and F. G. BENEDICT (*Amer. Jour. Physiol., 23 (1909), No. 6, pp. 412–419*).—Respiration calorimeter experiments with a subject having the use of only one lung are reported and discussed in comparison with similar data obtained with normal subjects. According to the authors, "the only deduction that can be drawn from the experimental data is that the reduction of the area for oxygen absorption and carbonic acid elimination in the lungs by about one-half has not materially altered the total metabolism."

ANIMAL PRODUCTION.

On testing the working capacity of heavy horses, K. L. VON LÜTZOW (*Deut. Landw. Presse, 36 (1909), No. 26, p. 285*).—The author presents in tabular form the loss in weight and number of days required to regain the original weight of three groups of horses after having been at hard work for two different periods of 14 days each, separated by a resting period of 3 days.

Twenty Belgian horses weighing from 755 to 850 kg. lost during the first work period from 20 to 60 kg. each, or an average of 42.75 kg. In the rest period 5 horses regained or surpassed their original weight. During the second work period 16 horses lost on an average 46.5 kg., and one of these lost 95 kg., whereas 2 other horses gained 10 kg. each, and 2 horses 15 kg. each. Most of the horses in this group regained their original weight in from 1 to 10 days.

Twenty light Belgian horses weighing from 645 to 730 kg. lost during the first work period from 25 to 65 kg. each, an average of 41.25 kg. After the 3 days of rest 6 of them regained or surpassed their original weight. After the second work period the loss ranged from 5 to 85 kg. each, or an average of 32 kg. All but 4 of the horses regained the original weight in from 1 to 9 days, but these had not recovered it at the end of 14 days.

Eight light Danish horses weighing from 590 to 660 kg. lost during the first work period from 35 to 80 kg. each, an average of 51.1 kg., and none of them regained the original weight after the 3 days' rest. At the end of the second work period 4 had lost from 10 to 45 kg., an average of 28.75 kg., 3 had gained 5 kg. and 1 had gained 40 kg. It required from 1 to 6 days for this last group of horses to recover the original weight.

At the close of the working periods the pulse of each horse was taken. As a rule from ½ to 3½ hours elapsed before the pulse became normal. During the entire experiment each horse received an extra feed of 3 to 4 kg. of oats per day. It is suggested that by the determination of the loss in weight we have a quantitative method of estimating the soundness and capacity for work of draft animals.

The determination of the shoulder slope of horses, M. MÜLLER (*Landw. Jahrb., 37 (1908), No. 5, pp. 873–893, figs. 3, dgms. 2*).—The degree of obliquity of the shoulder blade in horses has been determined by previous investigators from the median ridge, but the author submits comparative measurements which show that the ridge does not coincide and is not parallel with the median line of the shoulder blade.

In measurements obtained from 38 horses the deviation of the ridge from the vertical ranged from 19° 30″ to 39° 49″, and the median line of the shoulder blade ranged from 26° 51″ to 44° 40″. The difference between the two angles in the same horse varied from 1° 53″ to 11° 5″. Hence, the shoulder blade is much steeper than is commonly supposed. In judging horses the steepness of the shoulder blade must be considered in connection with other factors. Too steep a shoulder may be counterbalanced by a more horizontal humerus.

The angles formed by other bones were also determined by the author.

Comparative anatomical and physiological investigations of fast and slow horses, K. L. VON LÜTZOW (*Landw. Jahrb., 37 (1908), No. 5, pp. 731–855*).—In this study the author presents data on the live weight, external body measurements, weight of heart, lungs and different parts of the central nervous system, volume of the thoracic cavity, stomach and cecum, volume and length of the colon, and measurements of individual bones.

It is pointed out that in the present state of our knowledge but little practical application can be made from the data collected, its chief value being as a contribution to the statistical study of variation and to furnish a stimulus for further inquiry on the subject. There are, however, a few deductions which may be obtained from the determinations made, among which are the following: The thoracic cavity volume and weight of lung are larger in slow horses than in fast horses. The heart weight is proportionally larger in fast horses. The spinal cord is heavier in lean horses than in fat horses of the same group. The cerebellum is larger in early castrated than in late castrated horses.

Throughout the article the results are compared with those obtained by previous investigators. The literature on the subject is appended.

Comparative anatomical and physiological investigations of fast and slow horses (*Fühling's Landw. Ztg., 57 (1908), Nos. 23, pp. 791–794; 24, pp. 839–844; 58 (1909), No. 4, pp. 153–158*).—In this series of articles by H. Rodewald, T. B. von Neergaard, and K. L. von Lützow are discussed the methods used in the investigations noted above.

Studies on the physiology of reproduction in the domestic fowl. Regulation in the morphogenetic activity of the oviduct, R. Pearl (*Jour. Expt. Zool., 6 (1909), No. 3, pp. 339–359, pls. 2, figs. 2; abs. in Science, n. ser., 29 (1909), No. 741, p. 428*).—This paper, which is the first of a series on reproduction in fowls, contains an outline of the work in progress at the biological laboratory of the Maine Station, and reports a case of regulation in the morphogenetic activity of the oviduct.

The first egg of a Barred Plymouth Rock pullet was abnormal in shape (long and narrow and concave on the side). As other eggs were successively laid there was a gradual change in shape from the abnormal condition found in the first egg to a substantially normal condition. The progressive regulatory change was in accordance with the logarithmic curve of the type $y=a+bx+c \log x$, where y denotes the length-breadth index of the egg, x its ordinal number in the series laid, and a, b and c are constants.

From the data obtained in this case it is concluded that the shape of the egg is determined by the active contractions of the muscular wall of the uterus.

Resection and end-to-end anastomosis of the oviduct in the hen, without loss of function, R. Pearl and F. M. Surface (*Amer. Jour. Physiol., 22 (1908), No. 3, pp. 357–361, fig. 1; abs. in Jour. Roy. Micros. Soc. [London], 1908, No. 6, p. 707*).—To determine whether or not a portion of the oviduct of a hen could be removed without permanent loss of the egg-producing function, the author removed a piece of the oviduct about 10 cm. long from the middle of the albumin-secreting portion. A perfect end-to-end anastomosis was obtained. Four months later the hen began to lay and the eggs produced were normal except for a slightly smaller size than the average for a normal hen of the same breed.

The artificial modification of the epithelial elements of the mammalian ovary, A. Russo (*Mem. R. Accad. Lincei, Cl. Sci. Fis., Mat. e Nat., 5. ser., 6 (1907), No. 12, pp. 315–384, pls. 5*).—The author describes the histology and physiology of the ovary and discusses Mendelian and other theories of sex heredity. His experiments consisted in making subcutaneous and intraperitoneal injections of lecithin in rabbits. From the results obtained he concludes that the proportion of females can be increased in this way. Two kinds of ova are figured and described. Those in which more or less fat is in evidence are said to be females; the others males. Throughout the article are numerous references to literature on the subjects discussed.

The influence of lecithin on the determination of sex and in Mendelian characters, C. Basile (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 17 (1908), I, No. 10, pp. 643–652*).—The author repeated Russo's experiments (noted above) but did not get an increased number of females. There was, however, an increased reproductivity and also an increase in the mortality of young germs.

Note on Russo's attempt to show differentiation of sex in the ovarian ova of the rabbit, W. Heape (*Proc. Cambridge Phil. Soc., 14 (1908), No. 6, pp. 609–612*).—The author discusses the results found by Russo (see above) and shows that the male ova figured are degenerate forms and are of common occurrence.

On the relation of race crossing to the sex ratio, MAUD D. and R. PEARL (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 15 (1908), No. 4, pp. 194–205; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 1, p. 33*).—The authors discuss the prevalent opinion among practical stock breeders that hybrids show an excessive proportion of males and they report a statistical study of the effect of hybridization on the human race.

"Statistics of over 200,000 human births extending over a period of 10 years in the city of Buenos Aires show that the proportion of males to females is significantly greater when the parents are of different racial stocks than when they are of the same. In the data are involved three racial stocks in pure and cross matings. The preponderance of males in the offspring of cross matings appears not to be capable of explanation as the result of environmental or demographic influences. Experimental investigations are necessary in order to reach adequate explanations of such statistical facts regarding sex ratios as are set forth in this paper."

On the sex of hybrids in the family of Phasianidæ, M. F. GUYER (*Compt. Rend. Soc. Biol. [Paris], 65 (1908), No. 37, pp. 642–644; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 2, p. 176*).—Of 61 museum specimens of hybrids of pheasants, turkeys, peacocks, and barnyard fowls the sex was not noted in 10 cases, was male in 47, and female in 4. It is suggested that the predominance of males may be due to defective nutritive conditions, associated with two dissimilar germ plasms.

On the sex of hybrid birds, M. F. GUYER (*Biol. Bul. Marine Biol. Lab. Woods Hole, 16 (1909), No. 4, pp. 193–198*).—The data reported are noted above.

On the principles of heredity as applied to the production of new forms of plants and animals, A. DENDY (*Jour Roy. Soc. Arts, 57 (1909), No. 2947, pp. 525–534, dgms. 2*).—This is a popular article on Mendel's law and its significance for the practical breeder. Recent instances are cited to show how new varieties can be produced by combining unit characters. Concerning the inheritance of acquired characters the author says: "From the nature of the case it appears extremely doubtful whether we shall ever be able to find a practical solution of this problem."

On some features in the hereditary transmission of the self-black and the "Irish" coat characters in rats, I, G. P. MUDGE (*Proc. Roy. Soc. [London], Ser. B, 80 (1908), No. B 537, pp. 97–121, dgm. 1, charts 3*).—From a study of Mendelian inheritance in rats the following results were obtained:

Black is dominant to albinism, though not complete. There appear to be two "Irish" types, and one and possibly both are heterozygotes. The carrying power of albinism of rats is similar to albinos of mice and rabbits. Self-gray types may carry both black and piebald recessive. Piebald black-white type may be homozygous or black and piebald, or may carry albinism recessive.

On some features in the hereditary transmission of the albino character and the black piebald coat in rats, II, G. P. MUDGE (*Proc. Roy. Soc. [London], Ser. B, 80 (1908), No. B 541, pp. 388–393*).—In this second paper the author reports results of matings with albinos and piebald rats.

Albinos when mated breed true to albinism whether their ancestors were pigmented or not. When a piebald black rat is mated with a similar one two different classes of offspring may occur: (*a*) All black piebalds; or (*b*) a mixture of black piebalds and albinos in nearly equal numbers. A piebald black rat mated with an albino may give five different results, due to the gametic nature of the albino employed.

Influences of pure-bred sires, H. E. VAN NORMAN (*Pennsylvania Sta. Rpt. 1908, pp. 129–145, pl. 1*).—For the past 17 years records have been kept of a herd of grade Guernsey cows kept at the station. The data reported illustrate

how a herd may be improved by the use of pure-bred sires. During the first 5 years the average yield of milk per cow per annum was 4,270 lbs., and the average yield of butter fat 225.7 lbs. Corresponding figures for the past 2 years are 5,731 lbs. of milk and 272.3 lbs. of fat.

"The complete records of all daughters which completed one or more years' record are submitted for public record and study by those interested in the problem, not because the records are phenomenal. The records are such as any good farmer should duplicate, and are suggestive when it is recalled that the average cow of the State produces less than 160 lbs. of fat per year."

The records show a marked difference in the influence of the different sires that have been at the head of the herd.

Methods of breeding for the improvement of Michigan cattle. Organization of cooperative cattle breeders' associations in Michigan, R. S. SHAW and W. F. RAVEN (*Michigan Sta. Circ. 4, pp. 33–44, figs. 3*).—This circular outlines plans for improving the cattle of Michigan and contains a report of the field agent on the work done toward organizing cooperative cattle breeders' associations. Articles of agreement and by-laws suggested for such associations are included.

The sheep stock of Gloucestershire, B. SWANWICK and J. T. HOBBS (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 32–48*).—This is a short account of sheep breeding in the county of Gloucestershire, with special reference to the development of the Cotswold and Oxford Down grades of sheep.

A biometrical study of egg production in the domestic fowl. I, Variation in annual egg production, R. PEARL and F. M. SURFACE (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 110, pt. 1, pp. 80, figs. 17*).—This is the first of a series dealing with a biometrical study of the results obtained at the Maine Station in cooperation with the Bureau of Animal Industry of this Department in breeding for egg production since the introduction of the use of trap nests in 1898. The plan of the breeding work has been previously noted (E. S. R., 18, p. 471).

Some of the problems discussed are variation curves of ovulation statistics and their biometric constants, relation of variation to fertility, influence of environment on variation constants, influence of selection on egg production, and relation of first year to second year production. The breeds used in the work reported were Barred Plymouth Rocks and White Wyandottes, all from homogeneous stock. A small number of Light Brahmas were used at first but were soon discarded. The first year production was considered to be a good measure of total production, and the few birds which laid no eggs the first year have been excluded from the statistical analysis. The year 1902–3 was not regarded as a normal year for the Plymouth Rocks, as they were laying in August and molted in December. The years 1903–4 and 1906–7 include records of 11 months only.

In grouping the frequency distribution the ordinary methods of biometric analysis were used. A class unit of 15 eggs was adopted. In deducing the moments from the grouped material Sheppard's corrections were used. In deducing constants from the ungrouped material the mean and median were calculated by ordinary arithmetical methods.

In getting curves to graduate statistics raw moments were found to be less satisfactory than corrected moments. The units used were large but there was a fairly close approximation at both ends of the range. In calculating the standard deviation the method of moments was used. Other formulæ used are discussed in detail. The authors summarize their findings as follows:

"Variation in annual egg production exhibits the following characteristics: (*a*) The observed range of variation is from zero to about 250 eggs; (*b*) the

distributions are usually unimodal and unsymmetrical. The asymmetry or skewness, when it exists, is always in the negative direction; that is, the modal egg production is always larger than the mean egg production. (*c*) The amount of variation in egg production is both absolutely and relatively large. The mean value of the coefficient of variation from all our data is about 34 per cent. (*d*) Variation in egg production, so far as our statistics show, belongs to the type of continuous, so-called 'fluctuating' variation.

"Analytically considered, such of the variation polygons as are skew are found to conform to Pearson's Type I curve. The symmetrical distributions belong either to his Type II or the normal curve of errors. The range of variation is in nearly all cases greatly overestimated by the theoretical curves. It is pointed out that this appears to be a characteristic of fecundity curves frequently.

"It is shown that during the period covered by the statistics (1899–1907), which covers practically the whole period of the breeding experiment, there has been, apart from fluctuations up and down in individual years, a small but steady decrease in the mean or average annual egg production.

"During the same period (1899–1907) the variability in annual egg production has not sensibly changed. There have been chance fluctuations up and down in individual years, but there has been no steady trend toward lower or higher variability. The same statement applies to the skewness of the distributions in the period covered by the investigation.

"The percentage of extremely high layers (producing more than 195 eggs in the pullet year) in the flock decreased during the period from 1899 to 1907. The percentage of exceptionally poor layers (producing less than 45 eggs in the pullet year) in the flock increased during the same period.

"The general characteristics of variation in annual egg production in White Wyandottes are essentially similar to those described above for variation in Barred Plymouth Rocks.

"Evidence from the literature is presented tending to show (*a*) that it is possible to get average annual egg yields higher than any of those which have been observed at the Maine Experiment Station, and (*b*) that records exist showing that in exceptional cases average annual egg yields were obtained during the middle and earlier half of last century which were just as high as any we now know.

"When the laying hens were kept in flocks of 100 birds each the average annual egg production per bird was distinctly and significantly lower than when they were kept in flocks of 50 birds each, though the number of square feet of floor space per bird was the same in the two cases and all other environmental conditions were made as nearly as possible identical.

"Laying birds kept in flocks of 150 birds each, and with somewhat less floor space per bird than those kept in flocks of 50 and 100 birds each, have in every case an average annual egg production significantly smaller than that of the birds kept in smaller flocks. It is pointed out that great caution must be shown in drawing practical conclusions from these results relative to housing, because we are here dealing only with annual egg production.

"Those conditions of housing and flock size which tend to lower the mean annual egg production are found to tend to increase the variability of the production, so that poor producing flocks are at the same time flocks very variable in production, and vice versa.

"Egg production in the second laying year is found, on the basis of rather meager data, to average about a third lower and to be distinctly more variable than that in the pullet year. There is no sensible correlation between the production of the first and second year.

"During the period covered by the statistics all birds used for breeding have been the offspring of mothers laying 160 or more eggs in their pullet year and of fathers which were the sons of high-producing mothers. It is now possible to determine what have been the results of this extensive experiment in selection. It is shown that the intensity or stringency of selection became relatively greater during the progress of the experiment, though the absolute standard of selection remained the same. It is further shown that there is no evidence that the selective breeding practiced has improved the strain in respect to egg production. On the contrary, the data show that (*a*) the mean egg production has diminished during the experiment, (*b*) the variability in egg production has remained unchanged, and (*c*) in the last years of the experiment relatively slight environmental changes caused very marked changes in the flock productiveness. This is obviously inconsistent with the view that any particular type of egg production has in any way been fixed in the strain by the breeding.

". . . The practical conclusion to be drawn from the results of this breeding experiment seems to us to be clear. It is that the improvement of a strain of hens in egg-producing ability by selective breeding is not so simple a matter as it has been supposed to be. Nothing could be simpler than breeding from high producers to get high producers. But if this method of breeding totally fails to get high producers—in other words, if the daughters prove not to be like the mothers in egg production—it can not fail to excite wonder as to whether the simplicity of the method is not its chief (possibly its only) recommendation."

Poultry notes, 1908, R. Pearl and F. M. Surface (*Maine Sta. Bul. 165, pp. 29–48, figs. 5*).—This bulletin is a report of the progress of the work in poultry at the station in 1908.

Some of the changes made for facilitating the work are the adoption of new methods in pedigree poultry breeding, and the erection of a hospital house for sick poultry and for carrying out experiments of a physiological character. A new type of trap nest has been constructed, and an improvement has been made in ventilating the brooder house. Details for using liquor cresolis compositus for destroying bird lice are given.

A diagram of the seasonal distribution of egg production for the past 9 years "shows that beginning with an average production of between 4 and 5 eggs in November the line rises rather sharply to an average production of nearly 12 eggs per bird in January. The line drops slightly in February, then rises very sharply to a maximum of a little more than 16 eggs per bird for the month of March. From March on the line drops very steadily forming almost a straight line until it reaches a low point in October." The form of a price curve platted on the same diagram is similar to that of the production curve turned upside down, yet there is a lag of the price curve behind the production curve. Examples are cited to show that the value of a bird for egg production depends upon the season the eggs are laid as well as upon the number of eggs. One bird laid 193 eggs during the year, which were worth $4.24; another bird laid 184 eggs, but were worth $4.83, as a larger percentage of them were laid when eggs were high. It is the purpose at this station to develop a breed which will lay in the winter season.

A method is proposed for estimating egg production on a percentage basis as follows: "The measure of an individual hen's egg production in any given time may be taken to be the percentage which the number of eggs actually laid is of the maximum number of eggs which might have been laid by the individual in this given length of time, assuming the production of one egg a day to be the maximum of which a hen is capable." For the purpose of easily calculating this percentage a table is presented which shows the maximum

possible number of eggs which can be laid from the first day of any given month to the first day of any other month.

Brief summaries of the two articles abstracted above are also included.

Methods of poultry management at the Maine Agricultural Experiment Station, R. PEARL (*U. S. Dept. Agr., Farmers' Bul. 357, pp. 39, fig. 10*).—The information in this publication has been compiled chiefly from Bulletin 90 of the Bureau of Animal Industry of this Department (E. S. R., 18, p. 471) and from various bulletins of the Maine Station. The principal topics treated are the selection of breeding stock, raising chickens by natural and artificial processes, feeding chickens on the range and the cockerels for market, housing and feeding the hens, the yards, a poultry house disinfectant, and trap nests. A portable brooder house, a chicken feeding trough, a trap nest, and two types of curtain-front houses are figured and described.

Methods of keeping pedigree records in use at the Rhode Island Agricultural Experiment Station, L. J. COLE (*Rhode Island Sta. Rpt. 1908, pp. 317–324*).—The method of keeping pedigree records used in the poultry experiments at this station for the past few years is described. It is a modification of the method used by Galton for keeping human pedigree records.

Breeding work with pigeons, L. J. COLE (*Rhode Island Sta. Rpt. 1908, pp. 299–302*).—This is a preliminary report on the inheritance of color in Tumbler pigeons. When red Tumblers and black Tumblers are mated black appears to be dominant and red recessive. The birds of the first generation are all black but with reddish tips that may be lost in later molts.

Naturalizing the ostrich, W. ROBINSON (*Amer. Rev. of Reviews, 39 (1909), No. 5, pp. 561–566, figs. 9*).—This is a popular article on the ostrich industry.

Commercial feeding stuffs, J. L. HILLS, C. H. JONES, and C. L. BEACH (*Vermont Sta. Bul. 138, pp. 3–10*).—Analyses are reported of cotton-seed, linseed, and alfalfa meals, gluten, flax, molasses, oat and hominy feeds, distillers' and brewers' grains, and poultry and miscellaneous feeds.

Licensed commercial feeding stuffs, 1908, F. W. WOLL (*Wisconsin Sta. Bul. 170, pp. 3–96*).—A total of 521 samples of licensed and 69 samples of unlicensed brands of feeding stuffs were analyzed during the past year under the State feeding stuff law, against 257 samples in 1907, an increase of 129 per cent.

The feeding stuffs analyzed included oil and cotton-seed meals, distillers' grains, gluten and hominy feeds, wheat bran, and middlings, red dog flour, rye, barley, buckwheat and mixed feeds, dried brewers' grains, malt sprouts, and poultry and miscellaneous feeds. The bulletin contains also a list of licensed manufacturers and dealers in proprietary feeding stuffs, the text of the feeding stuffs law in operation, and a discussion of violations thereunder.

On the digestibility of the different sorts of irrigated hay compared with meadow hay in the same district, K. FRIEDLAENDER (*Landw. Vers. Stat., 69 (1908), No. 3–4, pp. 245–258*).—In this digestion experiment with 2 wethers it was found that in all cases the irrigated hays had a higher protein digestion coefficient than had ordinary meadow hay. The reverse was true of the fat and carbohydrate coefficients.

A ration problem discussed, G. MIYAWAKI (*Hoard's Dairyman, 49 (1909), No. 10, pp. 340–342, dgms. 6*).—In this article the author gives illustrations of what is stated to be an easy method for balancing rations. It is an application of the method now in use for standardizing milk and cream.

DAIRY FARMING—DAIRYING—AGROTECHNY.

Milking machine experiments with the B. L. K. cow milker, F. W. Woll and G. C. Humphrey (*Wisconsin Sta. Bul. 173, pp. 3–30, figs. 4*).—The experiments reported in this bulletin lasted 20 months, and included 40 trials with 29 cows milked continuously with the machine for periods of from 4 to 62 weeks. The immediate effect on the milk yield was as follows:

"The average weekly yield of milk for the 27 trials during the last 2 weeks of hand milking was 176.8 and 173.7 lbs. per cow, a decrease of 3.1 lbs.; during the first 3 weeks of machine milking the corresponding figures were 166.7 lbs., 160.8 lbs. and 159.4 lbs., a decrease of 7.0, 5.9, and 1.4 lbs. for the 3 respective weeks, or on the average, 4.8 lbs. Only slight variations occurred in the number of cows gaining or losing in milk during the hand or the machine milking periods. Eleven cows gained and 16 lost in milk from first to second weeks of hand milking, against 9 gaining and 16 losing from second week of hand milking to first week of machine milking, which figures did not change materially during the following 2 weeks."

When the entire period was considered the machine-milked cows decreased on the average 2.9 lbs. of milk and 0.12 lb. of fat per week. These figures were found to be identical with data previously secured (E. S. R., 15, p. 502) for cows kept under similar conditions as these except that they were milked by hand.

In comparing machine milking with hand milking for the same cows the average figures obtained for the weekly decrease were "on machine milking, 1.2 per cent for milk and 1.3 per cent for butter fat, and for hand milking, 1.3 per cent for milk and 1.2 per cent for fat. These results agree so closely that they may be considered identical for all practical purposes.

"The amount of strippings obtained during the progress of the experiment for the different cows gradually decreased from the first to the tenth week, and after this period the weight of strippings remained practically constant at 1 to 3 lbs. per week, or 0.1 to 0.2 lb. per milking, the average weight of strippings from different cows when they had become accustomed to machine milking being a little over 2 lbs. per week, or about 2 ozs. per milking."

During 1 week 10 cows were stripped by the manipulation method after the regular milkers had finished and the results were compared with 10 machine-milked cows.

"The strippings secured from both lots of cows were practically the same in amount or in percentage of the total milk yield, for the weeks considered, the average amounts of strippings from the 10 machine-milked cows for the week being 21.6 lbs. (1.7 per cent of the total milk yield), and for the 10 hand-milked cows, 21.9 lbs. (1.6 per cent of the total yield)."

A short trial of machine milking without stripping led to the opinion that the practice is not to be recommended.

In studying the keeping quality of milk drawn by the two systems there was found to be but little difference, but such differences as were observed were always in favor of the machine-drawn milk.

"Machine milking had no appreciable effect upon the physical condition of the cows used, nor did it in any way affect the udder of the majority of the animals. It was apparently responsible for some improvement in the udders of three of the cows and in two cases possibly caused an aggravation of previously noted abnormal conditions.

"The economy of machine milking is due to a saving in time and in help necessary to milk a large herd. About 5 minutes per cow is saved where 4 cows are milked at once and more time when one man operates three machines milk-

ing 6 cows at one time. The cost of operating two machines by electric motor was about 4 cts. per hour, where electric current was used."

In answer to inquiries of 41 dairy farmers, covering periods of 1 month to over 2 years, 27 reported favorable results with the machine, 8 were undecided, and 6 were unfavorable.

It is concluded from the investigation that "the success of machine milking depends largely upon the man operating the machine; in herds of 30 cows or more machine milking is both practical and economical and the machine itself seems durable and efficient, provided it is properly cared for by an efficient operator."

Bacterial efficiency of the milking machine, ELIZABETH B. MEEK (*Pennsylvania Sta. Rpt. 1908, pp. 146–159*).—There were examined 129 samples of hand-drawn and 136 samples of machine-drawn milk. The germ content of the milk drawn by a machine was found to be the larger, but there was a gradual diminution in both hand-drawn and machine-drawn milk as there was increased attention to details at the barn.

"The number of bacteria per cubic centimeter varied widely from day to day, but a sudden increase could almost invariably be accounted for in lack of power to steam the machine or negligence in cleaning stable or cows. . . . Several times when the samples were unexpectedly taken there was an increase, in one instance, from 60,000 to 300,000, in another to 500,000 per cubic centimeter."

How prolific a source in increasing bacterial content the machine may be when it receives scant attention is seen in the following table, which shows how the bacteria in rinsing decreased as the machine was more carefully washed and hose and cups kept in brine:

[*Number of*] *bacteria per cubic centimeter of water passed through milking machine.*

	Feb. 14.	Feb. 15.	Feb. 19.	Feb. 21.	Mar. 12.	Mar. 19.	Mar. 23.	May 4.	May 10.	May 17.
Can of machine.	3,000,000	440,000	172,000	88,800	288	146	61	44	51	46
Cups	123,250	13,500	64,000	5,000	256	.....	.....	.....	.....	.....
Hose	124,750	38,500	27,000	2,500	108	.....	.....	.....	.....	.....

The results are regarded as merely preliminary.

Milch cows and the production of store stock, K. J. J. MACKENZIE (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 79–94, figs. 5*).—In this article the characteristics of the dual-purpose cow are discussed. The author believes that dairymen can breed "large-framed cows of milking capacity far greater than the average found at present among dairy herds as will either in themselves when dry or through their male offspring supply material with which no reasonable feeder can for a moment find fault."

Tests of dairy cows, 1907–8, F. W. WOLL and R. T. HARRIS (*Wisconsin Sta. Bul. 172, pp. 3–33, figs. 18*).—During the year 1,327 tests of 418 cows were made, the results of which are reported in this bulletin. The cows tested included 264 Holsteins, 137 Guernseys, 14 Jerseys, and 3 grades. Photographs of some of the best cows tested during the year are reproduced in the bulletin. The rules governing the dairy test and the schedule of charges for making the tests are appended.

The amount of milk fat produced by milch goats and sheep, A. MORGEN (*Landw. Vers. Stat., 69 (1908), No. 3–4, pp. 295–316*).—The amount of milk fat produced by 2 goats was determined for the entire lactation period. One

goat that weighed 41.1 kg. produced 15.675 kg. of fat in 379 days, which is equivalent to 1.006 kg. per day per 1,000 kg. of live weight. The other goat weighed 33.7 kg. and produced 19.671 kg of fat in 380 days, or 1.536 kg. per day per 1,000 kg. live weight. Both goats gained in weight during the experiment.

From these results and from additional data obtained with sheep, the author concludes that according to the live weight sheep and goats yield a larger amount of fat than do cows.

Biological and biochemical studies of milk, VI, C. J. KONING (*Milchw. Zentbl., 5 (1909), Nos. 4, pp. 156–108; 5, pp. 217–227*).—Noted from another source (E. S. R., 19, p. 372).

Contribution to the knowledge of the composition and the nature of the membrane surrounding milk globules, E. ABDERHALDEN and W. VOLTZ (*Ztschr. Phys. Chem., 59 (1909), No. 1, pp. 13–18; abs. in Rev. Gén. Lait, 7 (1909), No. 12, p. 286*).—In continuation of earlier work (E. S. R., 16, p. 192) the authors report analytical data on the membrane of fat globules after separating by the Lehmann method.

The results were exceedingly variable. The ash content varied from 4.57 to 45.28, the phosphorus from 0.18 to 0.57, and the nitrogen from 7.2 to 12.01 per cent. Later experiments showed greater variation. Among the products formed by hydrolysis of the protein were tyrosin, 2.05 per cent; glutamic acid, 8.5 per cent; glycol, 0.5 per cent; alanin, 1.5 per cent; leucin, 2 per cent; and small quantities of phenylalanin and aspartic acid.

Milk pasteurization an economic and social duty, N. STRAUS (*Heidelberg, 1908, pp. 22*).—This is an address to the students of politial economy at the University of Heidelberg on the relation of the milk supply to infant mortality. In support of the advantages of pasteurization the author cites the results accomplished since the opening of milk depots in New York and other large cities.

The canning of peas, A. W. BITTING (*U. S. Dept. Agr., Bur. Chem. Bul. 125, pp. 32, figs. 6*).—This bulletin discusses the various phases of the pea canning industry from growing the crop to utilizing the by-products of the canning factory, the information being based upon factory inspection and on experimental data. There is a short historical note on the history of canning peas, factory operations at the present time are illustrated and described, and methods are suggested for a more economical treatment of the raw material and better sanitary conditions in the factory.

Chemical analyses for peas graded for size and quality show "more total solids and higher protein and starch content in the third-grade goods. This might be expected, as the third grade represents the more mature product. If canned peas were purchased for their nutritive properties only, then the third grade would be the preferable one to buy, but they are usually selected for their delicacy and flavor, which are found in the highest degree in the youngest and tenderest peas, or the first grade." It is suggested that a great saving of labor can be effected by separating thistles from the pea vines at the vining machine and by using a light brine to remove the thistle tops.

"Experiments were made to determine the effect of varying periods of blanching on the different sizes and grades of peas and the influence exerted on swelling, tenderness, color of the liquor, and fill of the can. While the primary object was to determine the relation of blanching to spoilage, the secondary effect on the commercial grading was evident. Young peas will stand either a long or short blanch better than old ones."

The increase in size by blanching for 10 minutes was much greater in grades 2 and 3 than in grade 1.

"Tender peas which are overblanched, soften, break open, and discharge free starch grains so as to make a muddy liquor, and if in great excess, the liquor in the bottom of the can becomes pasty. Old peas which are underblanched remain hard and unpalatable after processing, or, if given a hard process, they will take up all the liquor in the can and become a more or less thickened mass. Such peas never have clear liquor. If the tender and hard peas be mixed, and the blanching be set for the young peas, the older ones are not well done; if set for the older peas, the tender ones are overdone. It follows, therefore, that to get good results requires much judgment, and a system of blanching tests could possibly be worked out to advantage. . . . From a sanitary standpoint [the continuous washer] is the better type of apparatus [for blanching], though in practice the trough blanchers are probably the more economical but not so cleanly.

"Experiments made to determine the increase in the weight of peas as the result of processing showed that, given the same process, the first or best grade increased from 8 to 11 per cent, the second or intermediate grade from 16 to 21 per cent, and the third grade from 24 to 33 per cent.

"Cans heated gradually—that is, by turning the steam on slowly so that it required 10 minutes to heat the retort—have a clearer liquor than when the steam is turned on suddenly at full pressure. The very quick heating injures the peas in contact with the can and also causes a blackening inside of the can. . . . The effect of long processing is to cause a gradual decrease in the amount of free liquor in the can and to cause the peas to become sticky and adherent."

Of commercial canned peas 135 brands were purchased in the market and examined for weight, size, and quality. Many of these fell below the grade claimed.

"The peas taken from the vines at different times showed no constant change in the sugar content. The vines soured slightly, but the appearance of the peas remained unchanged. An increase in the cloudiness of the liquor was observed as the time after cutting was prolonged."

Chemical analyses of pea vine hay are given.

Canning vegetables in the home, J. F. Breazeale (*U. S. Dept. Agr., Farmers' Bul. 359, pp. 16, figs. 9*).—This is a popular article written specially for the information of farmers' wives. Sterilization and the kinds of jars and other containers for use in canning are discussed, and directions are given for canning corn, string beans, beets, peas, eggplant, okra, asparagus, cauliflower, carrots, parsnips, kohl-rabi, lima beans, squash, tomatoes, pumpkins, succotash, and "vegetable roast" or a mixture of several vegetables.

VETERINARY MEDICINE.

Immunochemistry, S. Arrhenius (*Ergeb. Physiol., 7 (1908), pp. 480–483*).—This is a review of work on immunochemistry, in which 140 titles upon the subject are referred to.

Opsonins and other antibodies, L. Hektoen (*Science, n. ser., 29 (1909), No. 737, pp. 241–248*).—This is a paper presented before the section of physiology and experimental medicine of the American Association for the Advancement of Science, at Baltimore, December, 1908, in which the author considers the present status of our knowledge of antibodies.

Opsonic technic, R. E. Walker (*Jour. Med. Research, 19 (1908), No. 1, pp. 237–257, figs. 8*).—The author describes methods which, in his opinion, with some practice will enable anyone having a fair laboratory training to do accurate work in this field.

The use of atropin sulphate in anesthetizing birds for surgical experiments, R. Pearl and F. M. Surface (*Jour. Amer. Med. Assoc., 52 (1909), No. 5, pp. 382, 383*).—The authors here report their experience with anesthetics in connection with investigations of the physiology of reproduction in the domestic fowl conducted at the Maine Station. At the commencement it was found that if any anesthetic was pushed to the point at which the bird was in satisfactory condition for operative procedure in about 9 cases out of 10 the bird would die on the table before the operation could be completed.

Nearly every method of anesthesia that has been advocated is said to have been tried but with failure to yield satisfactory results, except in the case of atropin used in connection with chloroform or ether anesthesia.

Complete relaxation with the disappearance of the reflex activity resulted when atropin was thus used. The method of procedure now followed by the authors is described as follows:

"Immediately before beginning the administration of the anesthetic a 1/200 grain atropin sulphate tablet is dissolved in 1 cc. of warm normal saline solution. The salt solution with the dissolved atropin is then injected subcutaneously in the axilla. Ether is used as the anesthetic. It is administered from a small improvised mask which admits of the condition of the comb being seen during the operation. Depending on how hard the ether is pushed, the bird is ready for operation in from 15 to 20 minutes after the anesthesia is begun. The dosage of 1/200 grain atropin to a bird may seem large, but we have never been able to see the slightest bad effect from it, provided the administration of ether was begun immediately after the injection of the atropin."

Zootechnic, veterinary, and epizootic service of Indo-China, C. G. Thomson (*Philippine Agr. Rev. [English Ed.], 1 (1908), No. 12, pp. 503–510*).—This is a translation of an article furnished by the veterinary authorities of Indo-China, to which the author adds some information.

Veterinary division, J. A. Gilruth (*New Zeal. Dept. Agr. Ann. Rpt., 16 (1908), pp. 163–214, pls. 3*).—In this report an account of the meat inspection is included. Among the affections considered are tuberculosis, septic metritis of cows, contagious stomatitis in lambs and sheep, facial eczema in sheep, partial hernia in fat lambs, a Hæmatopinus of sheep (*H. ovillus*), the sheep maggot (*Lucilia sericata*), new growths simulating tuberculous lesions due to Cysticerci in sheep, beef measles (*Cysticercus bovis*), bovine contagious mammitis, and blackleg, with brief notes on other diseases.

Anthrax in India, W. C. Lowe (*Vet. Rec., 21 (1909), No. 1086, pp. 738–744, pl. 1, charts 2*).—This is a report of an outbreak of anthrax in India which commenced in December, 1907. Records are presented in tabular form of 79 horses inoculated against the disease. Of these 40 were cured, 6 died, and 33 were destroyed.

Report on the causation and spread of anthrax, 1908, J. M. Young (*Aberdeen and No. of Scot. Col. Agr. Bul. 9, pp. 39, maps 2*).—On account of the extraordinary prevalence of anthrax in the County of Aberdeen an inquiry into its causation and spread was begun, and the information thus obtained during the past 4 years is here presented. The following conclusions have been drawn by the author:

"Anthrax occurs more frequently in sheep than is generally known. It is more likely to appear in feeding [for the butcher] than in hill [pasturing] or wintering sheep. There are many opportunities by which it may be spread by sheep to other farm animals. There is abundant evidence it is spread to other animals by cattle, horses, and pigs. It would be advisable to frame some regulations for the examination and proper disposal of the carcasses of feeding sheep dying suddenly. Shepherds on high as well as low land pastures

should adopt a better method of disposing of carcasses. There should be compulsory notification of all sudden deaths in farm stock."

On the excretion of anthrax bacilli in milk, W. H. HORROCKS (*Jour. Roy. Army Med. Corps, 11 (1908), No. 1, pp. 46–48*).—"The results prove conclusively that virulent anthrax bacilli are excreted in the milk of animals dying from anthrax acquired either naturally or artificially, but that the excretion of the bacilli only occurs a few hours before death, and consequently, the risk to the public is practically limited to one milking."

Protective and curative inoculation against dog distemper, F. RICHTER (*Die Hundestaupe, ihre Vorbeugung und Behandlung durch Impfung. Dessau, 1908, pp. 211, pls. 8; rev. in Vet. Rec., 21 (1909), No. 1077, p. 566*).—After reviewing the work done by various investigators the author reports his own investigations.

In a systematic test made of various prophylactic and curative sera used according to the directions of their inventors, only negative results were obtained. It was found that the virus of cow pox could be transmitted to the dog and that it produces in such cases the eruption of typical variolous pustules, which much resemble those of man. The author could not produce a disease resembling distemper by the inoculation of Copeman's bacterium or Lignières' *Pasteurella canis*.

On the relationship between Bacillus pestis and B. pseudotuberculosis rodentium, A. T. MACCONKEY (*Jour. Hyg. [Cambridge], 8 (1908), No. 3, pp. 335–341*).—The author reports experiments made with guinea pigs and rats, and draws the following summary:

"Morphologically and culturally the *Bacillus pseudotuberculosis rodentium* bears a strong resemblance to *B. pestis*. The filtrate from an autolyzed agar culture of *B. pseudotuberculosis rodentium* and a similar filtrate from a *B. pestis* culture both gave a precipitin reaction with pest serum. It has been found possible to immunize both guinea pigs and rats against plague by means of inoculations of cultures of *B. pseudotuberculosis rodentium*, and this immunity lasted in many cases at least 6 months."

A micro-organism which apparently has a specific relationship to Rocky Mountain spotted fever, H. T. RICKETTS (*Jour. Amer. Med. Assoc., 52 (1909), No. 5, pp. 379, 380*).—It is stated that a repetition of experiments with ticks resulted in the transmission of spotted fever to susceptible guinea pigs by 50 per cent of the seed ticks from infected females.

An examination of eggs of a female from Montana, that had produced fatal infection in two guinea pigs, showed the presence of an organism that appeared typically as a bipolar staining bacillus of minute size, approximating that of the influenza bacillus. These organisms were present in varying numbers in different eggs, but as a rule they were surprisingly numerous, and in some instances thousands were to be found in a single egg. Eggs from three females of a different species of Dermacentor that had been collected in Idaho and fed on an infected guinea pig also showed the presence of the same forms. The salivary glands, alimentary sac, and ovaries of infected females were literally swarming with exactly similar organisms. They appeared to be absent, however, from the viscera of the uninfected tick, both male and female. Similar forms have been found in the blood and serum of infected guinea pigs. The organism has not as yet been cultivated.

African tick fever—a personal experience, A. C. H. GRAY (*Jour. Roy. Army Med. Corps, 11 (1908), No. 1, pp. 49–55, charts 3*).—An attack of tick fever experienced by the author is here reported. The disease is supposed to have been contracted through the bite of a single *Ornithodoros moubata*. Tick fever

is said to be the worst of the many nonfatal diseases that occur in Uganda, and becoming more and more common every year.

The relation of bovine to human tuberculosis, W. L. Moss (*Bul. Johns Hopkins Hosp., 20 (1909), No. 215, pp. 39–49*).—This is an exhaustive review of the subject, both from the clinical and the autopsy point of view. The following conclusions are drawn:

"The clinical cases collected . . . in which the circumstantial evidence points more or less strongly to human beings having been infected with tuberculosis from bovine sources, can not be presented as furnishing absolute proof of the question, but they point so strongly to tuberculous cattle as a source of danger to man that with such evidence alone before us it would seem advisable to take strict precautions against bovine tuberculosis.

"The economic losses among the cattle themselves, aside from any possible danger to man, are sufficiently great to demand a vigorous effort to stamp out bovine tuberculosis.

"The evidence furnished by autopsy statistics of primary intestinal tuberculosis, reported by different observers, is very conflicting, and even if there was agreement on a high incidence, this evidence could only be taken as circumstantial, since there is abundant opportunity for primary intestinal infection to occur with tuberculous material of human origin.

"The use of tuberculins from human and from bovine bacilli has not yet thrown much light on the question. The agglutination reaction does not serve to differentiate the two types of bacilli.

"It seems definitely established that there are two distinct types of tubercle bacilli, the human and the bovine type, which in a majority of cases investigated have characteristics sufficiently fixed so that mutation from one type into the other does not occur.

"The bovine type of bacillus has been demonstrated in 20 per cent of a series of 306 cases among human beings.

"The bacillus which causes bovine tuberculosis may also cause tuberculosis in man. It must be borne in mind that every case of tuberculosis in man showing the bovine bacillus need not have received the infection directly from cattle, for it is easily conceivable that a human having become infected from cattle may pass the infection on to other human beings.

"The dangers from bovine tuberculosis to man are sufficiently great to warrant strict precautions against it."

A bibliographical list of 40 references is appended.

Intertransmissibility of bovine and human tubercle bacilli, F. M. Pottenger (*Jour. Amer. Med. Assoc., 52 (1909), No. 13, pp. 1007–1011*).—"Interpreting laboratory findings, animal experiments, clinical observations and the diagnostic and therapeutic use of tuberculins made from bacilli of both human and bovine varieties, as well as reasoning from the analogy between smallpox and cowpox, I feel that we have some light thrown on the question of intertransmissibility of tubercle bacilli of human and bovine origin that can not be derived from the laboratory and animal experiments alone.

"The following points in the discussion of this question seem to be pretty thoroughly established:

"Human and bovine tubercle bacilli are different, as shown in: (*a*) Morphologic characteristics, (*b*) cultural characteristics, (*c*) virulence for animals, (*d*) staining characteristics (not generally confirmed).

"Cattle can be immunized against bovine bacilli by inoculation with moderate numbers of human bacilli.

"The resistance of cattle can be overcome and infection brought about by inoculation of human bacilli in large numbers or in moderate numbers if the inoculations are kept up for a prolonged period of time.

"Human beings are sometimes infected with bacilli of bovine type.

"Reasoning from the data obtained from the diagnostic and therapeutic use of tuberculins made from bacilli of bovine and human types, we conclude that:

"Bovine and human bacilli are different in that their toxins are different.

"Judging from the manner in which patients suffering from tuberculosis react toward tuberculins made from human and bovine bacilli, we would conclude that both varieties of bacilli are able to produce tuberculosis in the human body, but that the localization of the two infections is more or less constant. We have found that:

"A. Infections of the lungs, larynx, and intestines, when complicating tuberculosis of the lungs, are, as a rule, best treated by tuberculins made from bovine bacilli. These infections are most probably produced by bacilli of human origin.

"B. Infections of the bones, glands (as a rule), peritoneum (with effusion), ear and genito-urinary tract are, as a rule, best treated by tuberculins made from human bacilli. These infections are most probably produced by bacilli of bovine origin.

"Reasoning from the analogy furnished by smallpox, the fact that human bacilli will immunize cattle against infection with bovine bacilli would suggest that bovine bacilli might immunize human beings against human bacilli; and, if our belief that tuberculosis of the bones is of bovine origin is true, and our observation that persons suffering from bone lesions rarely suffer from tuberculosis of the lungs is correct, we have clinical evidence which supports the fact that immunity in human beings against human bacilli may be produced by infection with bacilli of the bovine type."

Tuberculosis among animals, W. A. Brend (*Sci. Prog. Twentieth Cent., 3 (1908), No. 9, pp. 53–59*).—This is a brief review of recent work as related to the differences in the degree of susceptibility to tuberculosis exhibited by different classes of animals.

The economic importance of tuberculosis of food-producing animals, A. D. Melvin (*Amer. Vet. Rev., 35 (1909), No. 1, pp. 18–32*).—An address presented before the International Congress on Tuberculosis, held at Washington, D. C., in 1908, in which the subject is discussed at length.

It is concluded, as a general average, that about 3.5 per cent of the cattle of the United States are affected with tuberculosis. The loss on all food animals killed in this country is estimated at $3,832,436 annually. "Taking into consideration the various items mentioned, the tribute which the United States pays each year to this scourge among its farm animals aggregates more than $14,000,000. Such a loss is too great, merely as a matter of economics, to be allowed to continue and increase from year to year."

The curative treatment of tuberculosis in cattle by Professor von Behring's tulaselaktin (*Abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 84–96*).—This is an extract from the official report presented by the commission to the minister of agriculture of Argentina. The facts recorded in this report lead the commission to the following conclusions:

"Prof. von Behring's tulaselaktin has had no prejudicial effect on the experimental cattle, for the local reaction (at the seat of the injections) observed in some of the animals, and the general reaction, due to pulmonary congestion (very similar to that sometimes produced by an injection of tuberculin), noted in others, were temporary and apparently without influence on the subsequent development of the lesions.

"Prof. von Behring's tulaselaktin, as employed by Dr. Römer, his representative, has not caused the recovery from, or the retrogression of, the tuberculous lesions in the cattle to which it was applied.

"Tulaselaktin has not hindered the development of fresh tuberculous lesions in some of the experimental animals.

"The satisfactory general condition and increase of weight observed in a number of animals during the experiments can not be attributed to tulaselaktin, but to attention to hygiene, excellent fodder, the condition of rest in which they were kept, and the growth of the animals (young cattle in most cases), as is proved by the fact that the same things were observed in the animals that were not treated."

Differential methods for detecting the typhoid bacillus in infected water and milk, D. D. JACKSON and T. W. MELIA (*Jour. Infect. Diseases, 6 (1909), No. 2, pp. 194–204, figs. 2*).—"Bile is a natural medium for the growth of the typhoid bacillus and it retards the growth of other bacteria except *Bacillus coli*. When lactose is present in the bile *B. coli* causes copious gas formation and soon produces sufficient acidity to retard its own growth so that the final result is a predominance of *B. typhosus* which has been multiplying rapidly in the meantime and is not materially affected by this acidity.

"When samples of water or milk are inoculated into lactose bile and incubated at 37° C. and then transplanted in varying dilutions into Hesse agar, very characteristic colonies are formed in the high dilutions when the typhoid bacillus is present."

The authors were able to isolate typhoid cultures from feces with certainty at any stage of the disease from milk artificially infected with small numbers of *B. typhosus*, and from river, pond, and stream water.

The treatment of suppurative conditions in animals by a slight modification of the Wright-Douglass vaccine method, E. F. MCCAMPBELL and J. MCI. PHILLIPS (*Amer. Vet. Rev., 34 (1909), No. 5, pp. 600–608*).—Two methods that have given good results are described, together with directions for the preparation and use of the vaccine. Good results have followed the application of this vaccine in fistula of the poll and withers, and in suppurative conditions of the hoof, etc. Recovery is said to be extremely rapid when treated in the way described.

The diseases of the eye in domesticated animals, H. GRAY (*Vet. Rec., 21 (1909), No. 1082, pp. 678–688*).—An account of the various diseases of the eye and methods of treatment.

Special report on diseases of cattle (*U. S. Dept. Agr., Bur. Anim. Indus., 1909, rev. ed., pp. 551, pls. 52, figs. 27*).—This work, originally issued in 1892, and revised in 1904 (E. S. R., 16, p. 708), has again been revised in accordance with a resolution passed by Congress. The changes made in the present edition consist mainly in a revision of the chapters on diseases of the digestive organs, infectious diseases, and a substitution of a new chapter on animal parasites for the chapter on that subject in the edition of 1904.

Bovine contagious mammitis, J. A. GILRUTH (*New Zeal. Dept. Agr., Vet. Div. Bul. 13, pp. 9, pl. 1; Ann. Rpt., 16 (1908), pp. 202–208, pl. 1*).—The nature of this disease, its symptoms, transmission, prevention, and treatment are considered. Since attention was first drawn to the presence of the disease in New Zealand, 5 years ago, it appears to have spread extensively.

Mastitis of the cow, S. WALL (*Die Euterentzündungen der Kuh. Stuttgart, 1908, pp. VIII+122, figs. 29; rev. in Jour. Compar. Path. and Ther., 21 (1908), No. 4, p. 337*).—The author here discusses the various forms of mastitis of the cow. The observations and investigations made were largely upon tuberculous udders.

Statistics given regarding the localization of the disease in different quarters of the udder show that in a total of 115 cases the disease was confined to one quarter in 47 per cent, to 2 quarters in 33 per cent, to 3 quarters in 13 per cent, and that all 4 quarters were involved in only 7 per cent of the cases. One or both hind quarters were diseased in 91 per cent, and one or both fore quarters in 50 per cent, of the cases. The disease was confined to the hind quarters in 50 per cent, and to the fore quarters in 9 per cent of the cases.

The author concludes that the primary lesions in the gland are embolic, and started by bacilli which have been admitted to the blood stream from some tuberculous focus in the lungs. In regard to their source the reviewer says "when account is taken not only of the much greater frequency of lesions in the hind quarters, but also of the further fact that the supra-mammary lymphatic glands (which overlie the hind quarters) often show lesions which are obviously older than those in the udder tissue, and that the primary invasion of the latter is usually at the upper part of a quarter, the only permissible conclusion is that infection of the udder usually takes place by way of the lymphatic vessels."

Septicemia hemorrhagica in cattle, A. W. Curlewis (*Jour. Dept. Agr. Victoria, 7 (1909), No. 2, pp. 91–93*).—During the last few months considerable mortality in cattle has occurred in parts of Victoria from a form of septicemia hemorrhagica known in some countries as buffalo disease. Seven cases are here reported.

Parasitic diseases of sheep, D. F. Luckey (*Missouri Bd. Agr. Mo. Bul., 6 (1908), No. 10, pp. 34, figs. 17*).—Nearly all the losses of sheep are said to be caused by parasites, which are here briefly considered.

Experimental test of treatments for worms in sheep at Glen Innes Experiment Farm, M. Henry and J. D. Stewart (*Agr. Gaz. N. S. Wales, 19 (1908), No. 12, pp. 981–985*).—"The results obtained would seem to emphasize again the fact that the giving of good feed and salt is the best treatment to apply to sheep affected with worm infestation of any description; that while stomach and intestinal worms can be dislodged fairly readily, bronchial parasites can be so only with great difficulty; and that stock owners must look to preventive methods rather than to 'cures' to save themselves from loss from this cause."

Hemlock poisoning in pigs, I. Calinescu (*Arhiva Vet., 5 (1908), No. 4–5, pp. 229–231; abs. in Vet. Rec., 21 (1909), No. 1076, p. 550*).—The author reports an outbreak of a fatal disease in swine found to be due to the eating of the stems and leaves of the large hemlock (*Conium maculatum*).

Horse sickness and its prevention, H. Watkins-Pitchford (*Natal Agr. Jour., 11 (1908), No. 12, pp. 1543–1558; Agr. Jour. Cape Good Hope, 34 (1909), No. 1, pp. 22–25*).—This is a paper read before the Annual Conference of the Intercolonial Agricultural Union in which the author presents a general account including the history of the disease.

The disease is essentially South African. By a process of elimination the author attempts to prove that the infection which is due to a filterable virus is transmitted by insects. Experiments are reported in which horses protected from mosquitoes by the screens of gauze netting remained unaffected while near-by unprotected horses were attacked by the disease. The use of smoke smudges to keep away insects has given considerable protection from the disease.

The immunity of mules against horse sickness, A. Theiler (*Transvaal Agr. Jour., 7 (1909), No. 26, pp. 175–183*).—The author here reviews the results obtained from inoculations of mules against horse sickness, these being first introduced into practice in November, 1905.

A considerable variation was found in the variability of the virus. Finding that one particular kind of virus did not completely protect against subsequent inoculation of the second or third virus, a polyvalent virus was made composed of blood collected from mules showing relapses in practice, the ordinary virus, the Tzaneen virus, the Bulawayo virus, and blood collected from spontaneous cases of the disease. These were mixed together and injected into a horse which developed the disease. The animal was tapped during reaction and the virus obtained was the polyvalent virus.

While this virus did not completely prohibit a reaction from its constituents it prevented mortality. The author states that experience in practice has shown that an inoculation of mules with any of the virus used protected against death to the extent of 98.7 per cent. Breakdowns vary in the different districts and even in the same locality. In the laboratory it was possible, with blood obtained from immunized animals that died from horse sickness after exposure, to break the immunity given by almost any virus.

A malignant form of canine distemper, M. WHITE (*Amer. Vet. Rev., 34 (1909), No. 5, p. 635*).—The author has observed a canine distemper in Denver, Colo., that is quite different from the usual form. The affected dogs are said to show digestive complications, to bleed from the nose, and to discharge pus with the blood. Later the mucus membrane of the mouth shows a brick-red discoloration and inflammation, followed by bleeding from the mouth and bowel. Death takes place within 7 days. It is estimated that from 5 to 10 per cent of the cases are of this severe form.

Blackhead disease of turkeys, L. J. COLE (*Rhode Island Sta. Rpt. 1908, pp. 297–299*).—A brief account is given of the investigations now being carried on. As noted below, this disease has been found to be due to organisms belonging to the genus Coccidium. The investigations under way consist of a study of the life history of the causative agent, its resistance to injurious substances and conditions, its occurrence in and effect on other birds and mammals, the means by which it might in nature be transmitted from one bird to another, etc.

Blackhead, a coccidial disease of turkeys, L. J. COLE and P. B. HADLEY (*Science, n. ser., 27 (1908), No. 704, p. 994*).—The authors believe they have demonstrated that this disease is caused by a Coccidium which, according to the nomenclature adopted, may be of the variety *Coccidium cuniculi*, and that *Amœba melcagridis* Smith is probably the schizont stage in the development of the Coccidium. The stages of the Coccidium most commonly found were the schizonts and the macrogametes or oocytes.

By means of feeding portions of cecal content or parts of ceca of diseased birds, the disease was produced experimentally in turkeys, chicks, and sparrows, but not in guinea pigs, kittens, or rabbits. In young turkeys the disease is almost always fatal; older birds may recover. It is doubtful if death is caused directly by the Coccidium in the majority of cases; whether there is a specific accompanying organism pathogenic to turkeys under these conditions, and less so to chickens, has not yet been determined. In cases of perforation of the cecum, death soon follows from acute peritonitis.

No method of treatment is at present recognized.

A new parasitic disease of pigeons, A. LANFRANCHI (*Mod. Zooiatro, 1908, No. 6, Sup., pp. 289–317; abs. in Tierarzt, 47 (1908), No. 7, pp. 156–159; Vet. Rec., 21 (1909), No. 1076, pp. 549, 550*).—The author describes a new infectious disease of pigeons in which death results in from 10 to 20 days. Flagellates were found in the saliva and salivary glands, bone marrow, blood, and peritoneal exudate, in small nodules formed in the internal organs, and in the feces.

The young stages are said to be similar to those of trypanosomes. The parasite remains active for a long time in saliva and feces outside the animal body.

The water tanks of the pigeon cotes lodge the parasite and form centers of infection. It is thought that the parasite may be identical with the causative agent of gregarinous diphtheria of birds.

An affection known as botryomycosis and its parasite, G. BUREAU and A. LABBÉ (*Compt. Rend. Acad. Sci.* [*Paris*], *147* (*1908*), *No. 16, pp. 697–699*).—This disease is not a mycosis but is due to an amœba. The botryomyces observed in previous cases is only a plastogamic stage of this organism.

A study on the life history of a flagellate (Crithidia melophagi, n. sp.) in the alimentary tract of the sheep tick (Melophagus ovinus), L. D. SWINGLE (*Jour. Infect. Diseases, 6* (*1909*), *No. 1, pp. 98–121, pls. 3*).—The life history of *C. melophagi* has been worked out and is here reported. The author concludes that the sheep does not serve as a host of this flagellate.

Development of Hemogregarina lacertæ, A. LAVERAN and A. PETTIT (*Compt. Rend. Acad. Sci.* [*Paris*], *147* (*1908*), *No. 25, pp. 1378–1382, fig. 1*).—The authors discuss this subject at some length. They consider it probable that *H. lacertæ* passes a part of its life cycle in the ticks that transmit the infection. The exact manner, however, is unknown. An examination of 2 small ticks captured on an infected *Lacerta viridis* has not revealed in the digestive tract the existence of any element that can be interpreted as a form in the life cycle of *H. lacertæ*.

Remarks on the avian hemoprotozoa of the genus Leucocytozoon, L. W. SAMBON (*Jour. Trop. Med. and Hyg.* [*London*], *11* (*1908*), *Nos. 16, pp. 245–248, figs. 2; 21, pp. 325–328, figs. 9; 12* (*1909*), *No. 3, pp. 37, 38, fig. 1*).—A history of observations of these parasites, in which their morphology and life history are considered. Synonyms, hosts, and descriptions are given of the known species and a bibliographical list appended.

On the occurrence of nuclear dimorphism in a Halteridium parasitic in the chaffinch, and the probable connection of this parasite with a trypanosome, H. M. WOODCOCK (*Quart. Jour. Micros. Sci.* [*London*], *n. ser., 53* (*1909*), *No. 210, pp. 339–349, figs. 8*).—The author has obtained certain indications which point to a transformation of Halteridium from a flagellate stage, thus presenting the first definite piece of evidence tending to confirm one of Schaudinn's conclusions. The author concludes that Halteridium is probably a stage in the life history of a trypanosome which has advanced a step further and become adapted also to the red corpuscles.

Trypanosomiasis in animals, F. HARVEY (*Jour. Roy. Army Med. Corps, 11* (*1908*), *No. 1, pp. 12–23, figs. 3, map 1; Jour. Trop. Vet. Sci., 3* (*1908*), *No. 4, pp. 468–478, pls. 5*).—The author reports investigations made of a trypanosome found in cattle, horses, and dogs in the British colony of Sierre Leone, Africa.

"This trypanosome was found to increase in virulence by passage through the same species. Guinea pigs appeared most refractory and puppies least so. A natural strain from the horse appeared noninfective for dogs, but the cattle and dog strains were infective for horses. It is possible, therefore, that these may be two distinct strains; further work is required to settle this point. This trypanosome appeared to be invariably fatal and most widely distributed, and at one place, Minti, there were only 2 dying cattle left out of 60."

The species, which is nearly if not quite as virulent as *Trypanosoma brucei*, is considered as *T. dimorphon*, although clinically strikingly similar to nagana.

A trypanosome from Zanzibar, D. BRUCE, A. E. HAMERTON, and H. R. BATEMAN (*Proc. Roy. Soc.* [*London*], *Ser. B, 81* (*1909*), *No. B 545, pp. 14–30, pls. 2*).—This is a study of a trypanosome taken from a horse in Zanzibar which was suffering from an obscure disease. It is concluded that the species is *Trypanosoma dimorphon*, although proof of the identity or nonidentity of the carrier is wanting.

Note on the rôle of tabanids in the transmission of trypanosomiases, E. SERGENT (*Ann. Trop. Med. and Par., 2 (1909), No. 4, p. 331*).—The author has shown that the two species of horse flies most common in the Algerian Tell, *Atylotus tomentosus* and *A. nemoralis*, can experimentally transmit infection from a diseased to a healthy animal when the blood sucking follows immediately. In one experiment it was found that horse flies which had ingested blood from an affected animal could infect a healthy animal 22 hours later and not 48 hours later, as previously reported, through a typographical error, in an article previously noted (E. S. R., 18, p. 285).

Concerning the treatment of experimental trypanosomiasis, II, B. MOORE, M. NIERENSTEIN, and J. L. TODD (*Ann. Trop. Med. and Par., 2 (1909), No. 4, pp. 265–288, pl. 1, figs. 8*).—This is in continuation of experiments with various proposed remedies previously noted (E. S. R., 19, p. 478).

"None of the coloring matters employed was of much value; it is suggested that the active radicle in trypanocidal anilin derivatives is the 'trypanophobe' group, NH_2. . . . In the treatment of dogs, guinea pigs, and mice, the comparative value of (1) acetylated atoxyl followed by bichlorid of mercury, (2) of acetylated atoxyl, and (3) of atoxyl, is as the order in which they are named; none of these methods is usually able to definitely cure well-established infections in these animals.

"Atoxyl followed by bichlorid of mercury is found to be much superior to atoxyl alone in the treatment of rabbits infected with *Trypanosoma brucei;* the latter is also effective in the treatment of rabbits infected with *T. gambiense.* Atoxyl and mercury combined are distinctly superior to atoxyl alone in the treatment of donkeys infected with *T. brucei,* but neither method is able to cure a well-established infection."

Bibliographical references are given.

Contribution to a study of Porocephalus moniliformis, A. BRODEN and J. RODHAIN (*Ann. Trop. Med. and Par., 2 (1909), No. 4, pp. 303–313*).—The authors have found that in nature the immature stage of this parasite infests monkeys and the adult stage infests snakes. Man and various animals which accidentally swallow the eggs of this parasite become intermediate hosts. Snakes, particularly the larger species, if infested through swallowing intermediate hosts become definite hosts. Bibliographical references accompany the account.

The microscopic anatomy of Trichinella spiralis, C. FROTHINGHAM, Jr., (*Jour. Med. Research, 19 (1908), No. 2, pp. 301–308, pl. 1, figs. 2*).—The author presents a report of studies made of the microscopic anatomy of this parasite at two ages, one 3 days the other 10 days after the ingestion of infected meat. Both male and female are said to be developed in 3 days. The trichinellæ studied were in the intestines of rats which had been fed muscle from an infected cat.

Rubbing post for live stock (*Sci. Amer., 100 (1909), No. 13, p. 248, fig. 1*).—An illustration and a description are given of a rubbing post recently invented. The rubbing post contains a reservoir filled with insecticide or antiseptic, and may be placed in a suitable place convenient to the live stock. The application is produced automatically by the rubbing.

RURAL ENGINEERING.

Irrigation in Oregon, J. H. LEWIS and P. A. CUPPER (*U. S. Dept. Agr., Office Expt. Stas. Bul. 209, pp. 67, figs. 8, map 1*).—This belongs to the series of reports dealing with irrigation in the arid States, previously noted (E. S. R., 20, p. 987). Its purpose is to furnish information regarding the present status of irrigation and opportunities for settlement.

The authors describe the topography, climate, water and land resources, products of irrigated lands, water laws, settlement of irrigated lands, and the future development of irrigation farming. Climate and rainfall conditions are discussed in their relation to irrigation, the rainfall variations throughout the State being particularly noted. At Prineville the total annual rainfall is 8.2 in., while at Glenora it is 136.3 in. The water resources are stated to be exceptionally great because of the topography, the average run-off from the entire State being 1.9 second-feet per square mile. This is, however, mostly in the western part of the State, where it is impossible to utilize it for irrigation purposes, although the possibilities for water power development are apparently almost unlimited. The discharge of streams in the main drainage areas of the State is given in tabular form and there is a map showing the streams available for irrigation.

Of the lands in the State about one-third of the total area was public unreserved land on July 1, 1906. Its distribution and character are shown in a table compiled from the report of the U. S. General Land Office for 1906.

The leading feature of agricultural development in the State is the great variety and excellent quality of the products. The average yield and value of fruits in the State are given, and the yields and net profits of crops are shown by tables. Fruits are reported to yield from $120 to $350 an acre, while alfalfa has yielded a net profit of $32 per acre, and sugar beets of $40 per acre.

The fact of the large annual rainfall has made it difficult to convince the people of the need and benefit of irrigation and is thus operating against its development. The laws previous to 1909 have also not been favorable, and it is only within a few years that irrigation has developed rapidly. More expensive works are now being undertaken, largely it is thought because of Federal legislation.

The authors consider that the future of irrigation farming will be affected by recent favorable legislation, improved transportation facilities and methods of irrigated agriculture, and a better understanding of the needs and benefits of irrigation. Experiments conducted by this Office have demonstrated these benefits, but it is believed that actual demonstrations on a practical scale will be necessary to convince the landowners of the need for irrigation.

In discussing the laws the authors include the numerous statutes and court decisions prior to the 1909 law, the principal points and applications of which are noted and explained.

Irrigation in South Dakota, S. H. Lea (*U. S. Dept. Agr., Office Expt. Stas. Bul. 210, pp. 60, map. 1*).—This report, which is one of the series noted above, gives the present status of irrigation in South Dakota and includes the information deemed necessary for prospective settlers.

The first part of the bulletin describes the natural features of the State and mentions briefly its industries, viz, agriculture and stock raising, the latter being by far the more important. Considerable space is devoted to the water resources, under which are described the various river systems, with a map showing streams available for irrigation. Underground waters and the appropriated and unappropriated waters are enumerated. Tables of stream measurement, abstracted from the reports of the U. S. Geological Survey, are included.

The different types of land found in the State are indicated, with their location and extent, showing the unoccupied and irrigated areas. The greater part of the lands of the State are classed as arable, there being over 16,000,000 acres, exclusive of Indian farms, in this class. The rest of the area comprises National Forests, swamp and overflowed lands, hills and buttes, and 2,000 sq. miles of Bad Lands. The crops raised are small grains, fruits, vegetables,

alfalfa, and native hay, the smaller fruits and vegetables being the best irrigated crops. In the section of the State west of the Missouri River, and especially in that part adjacent to the Black Hills, irrigation is required to produce good crops, while the other half of the State has sufficient rainfall.

That part of the report dealing directly with irrigation embodies information as to the crops grown, the development of irrigation, a detailed description of the various enterprises, present and prospective irrigated areas, cost of land and water, and a discussion of laws governing the control and use of water, in which the author explains the State law in detail with an account of its operation and the functions of the State engineer. In conclusion recommendations as to the prevention of waste and the storage of flood waters are given, together with suggestions as to needed legislation.

Irrigation in Kansas, D. H. BARK (*U. S. Dept. Agr., Office Expt. Stas. Bul. 211, pp. 28, maps 2*).—This is another of the series of bulletins being issued by this Office to supply information as to conditions and opportunities for settlement in irrigated sections, and follows the same general plan.

The introduction deals briefly with the geography, climate, and topography, and the following subjects are discussed in order: Water resources, lands, products of irrigated lands, history of irrigation development, irrigation enterprises, laws governing the control and use of water, settlement of irrigated lands, and the future development of irrigation farming in Kansas.

Kansas is considered as a whole to be a well-watered State, but the need for irrigation is imperative in the western part, where the rainfall alone is not sufficient to grow ordinary crops. The enormous supply of underflow water is deemed to be a considerable factor in the water resources of the State, and to be destined to play an important part in the future development of western Kansas, particularly in the upper Arkansas Valley. This supply has not visibly been affected by individual pumps, and it is believed that but slight difficulty will be experienced in the future. The artesian flow also contributes to the amount of water available for irrigation.

Kansas has but little land that can still be homesteaded, and this is not irrigable. The irrigated land is confined to the western one-third of the State and but a small percentage of the land cultivated is under irrigation. Alfalfa is the principal irrigated crop, while sugar beets are successfully raised under irrigation.

A description of irrigation enterprises is given in detail describing the various ditches, their size, capacity, and area of land irrigated. This discussion includes the private pumping plants in the Arkansas Valley, with some results of tests made on them. A large number of tests under ordinary conditions at Garden City showed the cost of irrigating an acre to vary from 30 cts. to $1.50 with gasoline at 11.5 to 15 cts. a gallon, with a total lift of 15 to 30 ft. Windmills are used extensively in the shallow water districts, and some data on these is included.

The future development of irrigation in Kansas calls for the construction of large reservoirs to hold the entire flow of rivers, the installation of pumping plants and windmills in shallow water areas, new modes of irrigating, and a better understanding of the economical use of water, as well as winter irrigation.

Triennial revenue report of the public works department, irrigation branch, Bengal, for the three years ending 1907–1908 (*Trien. Rev. Rpt. Pub. Works Dept., Irrig. Branch, Bengal, 1907–8, pp. 88, dgms. 7, maps 6*).—This contains statistics relating to the cost, operating expenses and revenues of canals in Bengal. There are also given data relative to the extent of irrigated

areas under each project, the crops grown, duty of water on rice and other crops, and items on administration and control.

The theory of drainage, A. O. ANDERSON (*Brick, 30 (1909), No. 5, pp. 249–251, figs. 3*).—In this article the author discusses soils and their properties, the relation of moisture to the soil, and the purpose of drainage. There are also practical suggestions as to methods of draining, and a discussion of tile and open drains in which the author points out the advantage of tile drains.

Report of the commissioner of public roads (*Ann. Rpt. Comr. Pub. Roads [N. J.], 15 (1908), pp. 204, pls. 14*).—In a review of the road improvements made in New Jersey under the State Aid Law, the commissioner, F. Gilkyson, lays particular stress on the experiments conducted to determine the methods of construction and treatment which will insure permanency and resistance to the destructive influence of automobiles.

As a result of these experiments it is believed that the use of heavy asphaltum oil as a binder will prove the most satisfactory. Experience in repairing roads led to the recommendation that they should be first scarified to a depth of at least 2 in., all foreign matter removed, and then treated with the binding substance. Among the different methods of applying liquid binders used was one which differs somewhat from the ordinary methods, and which met with success. This was to apply the liquid between the surfacing of ¾ in. stone and the next course of 1½ in. stone, allowing it to work into the interstices. The surface layer was then spread and rolled, causing the oil to ooze up and adhere to the stone of this layer. The principal requirement is stated to be to incorporate thoroughly the asphaltum or other compound with the upper layers of the road.

A new machine was used in the construction of one of the experimental roads. This is a rolling tamper and is composed of a series of cast-iron sprocket wheels loosely revolving upon an axle. Each tooth has a superficial area of about 8 sq. in., which compacts the material thoroughly during its continued passage.

Peat deposits of Maine, E. S. BASTIN and C. A. DAVIS (*U. S. Geol. Survey Bul. 376, pp. 127, pls. 3, figs. 20*).—It is stated that the aim of this bulletin is "to present an estimate of the extent and value of the more accessible peat deposits of Maine and to direct attention to their economic importance. . . ."

The deposits in Maine are described by localities, with notes as to the value and probable yield as indicated by analyses and field tests. The analyses and determinations of fuel values are given in tabulated form at the end of the report.

Preceding the special reports on individual deposits there is a general discussion of the nature, origin and character of peat deposits, methods of preparing raw peat for the market, and the various factors bearing on its commercial exploitation.

[A peat gas producer] (*Sci. Amer., 100 (1909), No. 21, p. 392, figs. 2*).—This describes a peat gas producer designed to disintegrate the peat, that it may be thoroughly and uniformly heated. A muffler with thin sides connected to the gas engine is placed inside the producer so that the vibratory motion of its sides is transmitted in the chamber to the air and gas, which is forced alternately in and out of the pores of the peat, thus aiding in its being broken up. To accomplish this further, the peat chamber is connected with the base of the engine so that its vibrations also will be imparted to the peat.

The increased use of electric power in agriculture, K. KROHNE (*Elektrotech. Ztschr., 29 (1908), Nos. 39, pp. 928–935, figs. 15; 40, pp. 950–954, figs. 2; 41, pp. 979–984, figs. 3; Mitt. Deut. Landw. Gesell., 23 (1908), Nos. 11, pp. 332–337, figs. 7; 12, pp. 347–351; 13, pp. 369–372, figs. 3; 14, pp. 382–384, fig. 1*).—In this

article the author treats at some length the applications of electricity in agricultural operations and the relative economy of human, animal, and machine power. In the latter connection he discusses farm and labor conditions and their relation to the status of machine farming and the agricultural machine industry. This has developed so rapidly that the author believes Germany to be fast becoming independent of England and America.

There are detailed descriptions of machines and implements operated by electric power classified according to the nature of the work done, with diagrams illustrating their mode of operation under the various systems, and data relative to initial and operating costs.

A chapter deals with the extent to which electrical power is employed and with the central stations which furnish power to a large number of farms within their zone. It is stated that the use of electricity in agriculture is increasing with the development of water power as a source of electrical energy.

A new motor plow (*Landw. Masch. u. Geräte, 9 (1909), Nos. 10, pp. 2, 4, fig. 1; 11, pp. 5, 7*).—In the first of these articles there is described a new motor plow which has been successfully tested in Germany. In this, two plow frames with a variable number of shares are attached to the body of the wagon, one at each end. The machine is operated by benzin and is also provided with a drum for hauling on a light cable attached to an anchor wagon. This is a novel feature, the cable being used only when the soil is wet and there is a tendency of the wheels to slip. As it is used only in connection with the traction wheels great strength is not required and a light cable is sufficient. The anchor wagon need not be in line with the furrow, and it is thus possible to plow a strip 40 ft. without moving the anchor wagon.

The second article gives an account of the results of tests of this machine in different kinds and conditions of soil and when used as a traction engine. Its average hourly working capacity was found to be 2 acres, plowed to a depth of 8 to 9 inches.

Farm practices in applying land plaster in western Oregon and western Washington, B. Hunter (*Washington Sta. Bul. 88, pp. 8–24, figs. 10*).—It is stated that the practice of early spring application of land plaster as a fertilizer for leguminous crops is followed in this region, especially in the Willamette Valley. The amount used varies from 30 to 100 lbs. per acre, 50 to 60 lbs. being considered sufficient for a hay crop if evenly distributed. The plaster is as a rule distributed by hand, but it is difficult to secure even distribution by this means. The author therefore describes mechanical devices which have been worked out by farmers in the region and which have been used with satisfactory results in the distribution of plaster. "It is hoped that the descriptions given are sufficiently clear to enable any farmer who is reasonably handy with tools to construct, at a nominal cost, an efficient implement for distributing land plaster."

[A new corn shock loader] (*Farm Machinery, 1909, No. 920, p. 20, figs. 2*).—Illustrations and a brief description of a corn shock loader recently invented by J. B. Schuman are given in this article. The machine consists of a frame mounted on wheels, and bearing curved receptacles which are lowered to receive the shock and then elevated by horse power to an upright position on the wagon.

Cement pipe and tile, E. S. Hanson (*Chicago, 1909, pp. 110, figs. 25, dgms. 4, maps 2*).—This is a handbook containing information regarding the manufacture and use of cement pipe and tile.

In the first chapter there is a brief review of drainage conditions and the work of swamp land reclamation in the United States. The author outlines

the growing demand for proper farm drainage, pointing out the benefits of tile drains in this connection.

Considerable space is occupied with a discussion of the relative merits of clay and cement tile, with a review of the present controversy on this question. Evidence is presented to show that cement is generally superior to clay for tile and pipe.

A short chapter devoted to the chemical action of cement in the soil touches briefly on the effect of alkali on cement. The author considers that disintegration may be prevented by making the concrete impervious to moisture, which is possible if care is taken in selecting and mixing the materials.

The book includes the results of a number of strength tests of cement pipe in this country and in Germany, while there are 2 chapters on methods and cost of manufacture, describing plants and their equipment and giving cost data in different localities. The concluding chapter describes tile and pipe-making machinery on the market.

Concrete silos, C. W. GAYLORD and P. H. WILSON (*Concrete Rev., 3 (1909), No. 11–12, pp. 67, figs. 37*).—This pamphlet states the requirements for silos, sets forth the advantages of the use of concrete in their construction, and describes the various methods of employing it. It contains illustrations and descriptions of concrete silos in use, and gives directions for building solid, hollow-wall and concrete-block silos. The making of forms and methods of reenforcing and mixing and placing the concrete are described in detail, with plans and tables of data necessary.

RURAL ECONOMICS.

Decline of farming in southern-central New York, R. S. TARR (*Bul. Amer. Geogr. Soc., 41 (1909), No. 5, pp. 270–278*).—Statistical data on rural depopulation and the increase of tenant and share farming in the counties of Broome, Tioga, Chemung, Schuyler, Yates, Tompkins, and Cortland are presented and discussed. The causes of these economic phenomena are believed to be the competition of the West, shiftlessness in individual farmers, soil deterioration, bad roads, and social isolation.

While the outlook for farming is not regarded as very encouraging in this section of the State, the author believes that the industry could be improved, and to this end suggests as remedies the better education of the farmer, the planting of poor land to forests, road improvement, better marketing facilities, and extensive farming. The State statistics show about 20,000 vacancies on farms and these places are being taken by foreigners.

The agricultural labor problem in South Russia, S. SAGORSKY (*Die Arbeiterfrage in der Südrussischen Landwirtschaft. Munich, 1908, pp. 208, charts 5*).—This is a history of agricultural development in South Russia from the date of the emancipation of the serfs on February 19, 1861, to the present time, with particular reference to the effects of emancipation on the economic welfare of farm laborers and the peasant class. In general, under the system of land holding and other agrarian features which prevail throughout Russia, it is shown that the economic, social, and general welfare of the agricultural laboring classes is in a very deplorable condition in South Russia, which is taken as a typical agricultural section of the empire.

Rural conditions in the United States (*Jour. Bd. Agr. [London], 16 (1909), No. 2, pp. 132–135*).—A brief discussion of the report of the Country Life Commission (E. S. R., 20, p. 1089).

The agricultural holdings act, 1908 (*Jour. Bd. Agr. [London], 16 (1909), No. 2, pp. 113–117*).—A discussion of the main provisions of this act (E. S. R., 20, p. 990).

Agricultural legislation in France, H. L. RUDLOFF (*Landw. Jahrb., 38 (1909), No. 2, pp. 195–250*).—The author gives a historical sketch of French legislation relating to agriculture, the article being an epitomé of the French rural code discussed under the topics of the laws relating to land and labor, water rights, and the public welfare.

The significance of the colonial system to agriculture in Germany, WOHLTMANN (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 1, pp. 51–64*).—This is an address before the meeting of the German Agricultural Society at Berlin on February 24, 1909.

The author discusses the extent, location, and agricultural products of the German colonies, shows that these products do not compete to any extent with home production, and believes that the agricultural development of the colonies, particularly in the growing of tropical and subtropical products which are now imported from other countries, would be of great economic and financial advantage to Germany and her colonies.

Agriculture in Italy and the spread of socialism in rural districts, T. POGGI (*Coltivatore, 55 (1909), Nos. 3, pp. 65–68; 6, pp. 161–164; 13, pp. 385–389; 15, pp. 449–453; 18, pp. 545–549*).—The author discusses the extent of the formation of unions among the peasants in certain provinces of Italy as a result of socialist propagandists, points out the economic errors on which such doctrines rest, and offers suggestions for the improvement of rural conditions, the betterment of the agricultural classes, and the increase of social welfare in Italy.

Agricultural associations and their functions, F. CONVERT (*Rev. Vit., 31 (1909), No. 803, pp. 503–508*).—A discussion of the features of the proposed laws relating to the limitation of the functions of agricultural associations in France (E. S. R., 20, p. 888).

How shall the farmer pay off his mortgage? (*Württemb. Wchnbl. Landw., 1909, No. 19, p. 351*).—The great advantages to the farmer of being able to borrow money of agricultural credit societies on long-time loans at 4 per cent interest over every other method of securing credit are discussed in this article.

Agricultural credit in Roumania (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 3, pp. 400–404*).—A brief review of the development of agricultural credit in Roumania with statistics from 1882 to 1908, inclusive.

The progress of cooperative societies (*Indian Agr., 34 (1909), No. 4, pp. 102, 103*).—Cooperative societies in India increased during 1908 from 843 to 1,201, and the membership from 91,000 to 149,000. The cooperative credit societies lend money at 12½ per cent, as compared with the prevailing rate of from 37½ to 75 per cent charged by professional money lenders, though in some parts of India interest rates run from 150 to 720 per cent.

The agricultural labor system in Chile, P. COIGNARD (*Jour. Agr. Prat., n. ser., 17 (1909), Nos. 15, pp. 472–474; 16, pp. 494–496*).—The author shows that Chile is a country of large holdings, that the extensive system of agriculture necessarily prevails there, that settlements and villages are remote from each other, and that because of these conditions the agricultural labor system is different from what it is in many countries.

The life and labors of the permanent and temporary farm hands are described in detail, including the privileges granted as to residences, the amount and quality of food furnished, use of land for cultivation and pasturing of stock, fuel for household purposes, etc., rates of wages, the extent of piece work and its advantages to the laborer, the management of stores on large

farms for the accommodation of the laborers, and the way that the farm help pass their time on Sundays and holidays. The wages received are estimated as equivalent to nearly 700 francs per year (about $135), and fully one-half of this amount the laborer can save if temperate and industrious.

The scarcity of farm laborers, G. BERTONI (*Coltivatore, 55 (1909), No. 18, pp. 549–551*).—The author calls attention to the scarcity of farm laborers in Lombardy, Venetia, and the whole of south Italy as a result of emigration, and urges upon the government the necessity of proper legislation as a means of preventing further rural depopulation throughout Italy.

The rights of farm laborers, SCHLEGELBERGER and SCHROEDER (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 1, pp. 36–50*).—This includes two papers presented before the meeting of the German Agricultural Society at Berlin on February 24, 1909.

The papers deal with the relations recognized by the German law as existing between the farmer and his hired help of all kinds, with particular reference to the legal rights of laborers and domestics as to the interpretation of contracts, the giving of notices as to discontinuance of services, hours of labor consituting a day's work, and other factors bearing on the economic life of the different classes of farm hands.

The insurance of farm laborers against accidents at their work, U. GOBBI ET AL. (*Bul. Agr. [Milan], 42 (1908), Nos. 35, p. 1; 36, p. 2; 38, pp. 1, 2; 39, p. 2*).—This is a report of a commission appointed at a congress of the Agricultural Society of Lombardy, which treats of the different kinds of accident insurance societies for farm laborers in Italy, together with their organization, operation, amount of premiums, etc.

Farm bookkeeping, C. S. ORWIN (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 49–62*).—An outline of a system of bookkeeping for farmers is presented.

MISCELLANEOUS.

Biennial Report of Missouri State Fruit Experiment Station, 1907–8 (*Missouri Fruit Sta. Rpt. 1907–8, pp. 18*).—This includes a financial statement for the biennial period ended November 30, 1908, a report of the director on the work of the station for the biennium and its present needs, and reports of the entomologist and plant pathologist noted elsewhere in this issue.

Fifteenth Annual Report of Montana Station, 1908 (*Montana Sta. Rpt. 1908, pp. 167–186*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1908, a report of the director on the work and publications of the station during the year, lists of station publications, donations, and loans, and a meteorological summary of temperature, precipitation, wind direction, sunshine, cloudiness, and frost during 1908.

Twenty-first Annual Report of New York Cornell Station, 1908 (*New York Cornell Sta. Rpt. 1908, pp. XXXVII+265–492+68+24*).—This report, which is not intended for general distribution, contains the organization list of the station, a report of the president of the university, a report of the director which includes brief statements of the main lines of work of the various departments, a statement of expenditures under the State appropriation for the fiscal year ended September 30, 1908, and reprints of Bulletins 250–258 and of Circulars 1–3, which have been previously noted.

Annual Report of Pennsylvania Station, 1908 (*Pennsylvania Sta. Rpt. 1908, pp. 273*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1908, a report of the director on the work and publications of the station during the year, and departmental reports of which that of the meteorologist is abstracted on page 213 of this issue. The report

also contains several special articles abstracted elsewhere in this issue, a reprint of Bulletin 84, and reprints with some changes of Bulletins 85–90, previously noted.

Twenty-first Annual Report of Rhode Island Station, 1908 (*Rhode Island Sta. Rpt. 1908, pp. 218–349+VIII*).—This contains the organization list, a report of the director on the work of the station during the year, departmental reports the experimental work of which is for the most part abstracted elsewhere in this issue, a financial statement for the fiscal year ended June 30, 1908, a list of exchanges, and other data.

Report of the director, 1908, H. L. Russell (*Wisconsin Sta. Bul. 171, pp. 35*).—This contains the organization list; a report of the work of the station during the year, especially those phases dealing with administration, research, publications, and the extension service; brief summaries of Bulletins 153–163; lists of donations, loans, and exchanges; and a financial statement for the fiscal year ended June 30, 1908.

State fair meeting of the Ohio State Horticultural Society (*Ohio Sta. Circ. 89, pp. 19, figs. 2*).—This contains brief summaries of the papers and addresses presented at the meeting of the Ohio State Horticultural Society at Columbus, September 2, 1908, some of which are abstracted elsewhere in this issue.

Experiment Station Work, LI (*U. S. Dept. Agr., Farmers' Bul. 360, pp. 32, figs. 6*).—This number contains articles on the following subjects: Distance between corn hills, the bursting of carnations, street trees, spraying for weeds, market classes and grades of sheep, vetch hay and vetch silage for cows, digestibility of kale, hulled corn, and mixing fat into dough.

Durability and economy in papers for permanent records, H. W. Wiley and C. H. Merriam (*U. S. Dept. Agr. Rpt. 89, pp. 9–12*).—This is a report submitted by the committee of this Department on paper for departmental use.

"Those departmental publications which are distributed to the public should be printed on paper made from bleached chemical wood or its equivalent. This paper should be as light and thin as is compatible with sufficient strength and opacity, and its surface and color should not be injurious to eyesight. For bulletins and circulars of all kinds a paper weighing 40 lbs. per ream 25 by 38 is sufficiently heavy, while for large volumes containing 600 or more pages somewhat thinner and lighter paper should be used. . . .

"A small edition of each publication, or certainly of those of scientific value, should be printed on high-grade paper for distribution as permanent records to public and institution libraries. This paper should consist of at least 75 per cent rag stock, should be strong and thoroughly well made to withstand much handling."

Paper specifications, F. P. Veitch (*U. S. Dept. Agr. Rpt. 89, pp. 13–51, figs. 4*).—This enumerates and discusses the factors governing the quality and durability of papers for various purposes, describes the methods of the Bureau of Chemistry of this Department for testing paper, and gives specifications for practically all kinds of paper.

The papers used in many current publications and records are deemed open to serious criticism, in that "they are of inferior quality, needlessly heavy and bulky, and, because of the highly polished surface so frequently given them, injurious to the eyes. It is the purpose of this bulletin to point out how these conditions may be remedied."

NOTES.

Connecticut College and Station.—Charles M. Jarvis, of New Britain, and Henry W. Alsop, of Avon, have been appointed to the board of trustees, vice George S. Palmer and B. C. Patterson.

Georgia College.—A conference of the trustees, superintendents, and teachers of the district agricultural schools of Georgia was held at the college July 20–22 for the purpose of discussing problems of organization and methods of teaching and financing these institutions. Among those who took part in the conference were President Soule, of the college; Hon. R. F. Duckworth, of Union City, Ga.; and D. J. Crosby, E. Gentry, J. P. Campbell, and J. W. Willis, of this Department. Before adjournment it was decided to hold annual conferences of representatives of the district agricultural schools.

Idaho Station.—Arrangements have been made for the establishment at Clagstone of the third substation provided by the last legislature, the dry-farming substation having been located at Idaho Falls and the irrigation substation at Gooding. At Clagstone a tract of 200 acres near the junction of the Spokane International and the Idaho and Washington Northern railways has been contributed by the speaker of the State legislature for the purpose. A tract of 40 acres adjoining, which has been leased, is ready for immediate experimental work.

Kansas College and Station.—The farmers' institute work, for which the legislature increased the appropriation from $10,500 to $52,500, has been reorganized on a more extensive basis by the appointment of the following additional assistants: P. E. Crabtree and G. C. Wheeler, assistants in general farming, institutes, and demonstration work; C. V. Holsinger, institute and demonstration work in horticulture; C. H. Hinman, assistant in dairying; S. W. Black, work in agricultural education, school gardens, etc.; Miss Frances Brown, institute and demonstration work in domestic science; W. S. Gearhart, institute assistant in road making; and J. E. Brock, secretary.

These assistants, with the exception of the assistant in road making, are to devote their entire time to institute and demonstration work, spending from October 1 to March 1 at the institutes and the remainder of the year in demonstrations on county and private farms, orchards, and dairies, the building of roads and bridges, and similar field work.

C. K. McClelland, superintendent of the Fort Hays substation, has resigned, to take effect January 1, 1910.

Minnesota University and Station.—Harry Snyder has severed his connection with the division of agricultural chemistry, retaining the professorship of soils. J. A. Hummel, assistant chemist, and A. D. Wilhoit, assistant in soils, have resigned to engage in commercial work.

Nebraska University.—W. L. French has been appointed adjunct professor of dairy husbandry.

New Jersey Stations.—George B. Trasher has been appointed field asssistant in horticulture.

New York State Station.—L. L. Morell, of Kinderhook, has been appointed to the board of control.

North Carolina College and Station.—In addition to the annual appropriation of $70,000 for maintenance the legislature has appropriated $18,000 annually for the ensuing biennium for permanent improvements and equipment. Under a recent law the station bulletins and reports are to be published by the State printer, as is other State printing. I. O. Schaub, of the State station, has been appointed professor of agricultural extension.

North Carolina State Station.—By an act of the last legislature the duties of the State Crop Pest Commission have been transferrred to the State board of agriculture. A seed-inspection law was passed, the enforcement of which is left to the State board. The board is given authority to sell any of its test farms and invest the net proceeds in similar farms elsewhere.

Ohio University.—A bronze memorial tablet has been erected by the instructors and former students in agriculture and veterinary medicine to the memory of the late Dr. Norton S. Townshend, one of the founders of the university and its first professor of agriculture.

Oklahoma Station.—C. E. Sanborn, formerly of the Texas Station, has been appointed entomologist, and A. L. Lovett, assistant entomologist.

Oregon College and Station.—For the ensuing biennium a total of $210,000 was appropriated by the last legislature. Of this $60,000 is for additional equipment, $35,000 for a central heating plant, $55,000 for an agricultural building, $35,000 for a drill hall, $5,000 for greenhouses, and $20,000 for the purchase of additional land. The annual appropriation for maintenance was also increased to $80,000. An appropriation of $2,500 was made for dry-farming experiments and $3,000 for irrigation experiments, both in cooperation with this Department, and $15,000 was granted for the maintenance of the Eastern Oregon substation.

A law was also passed under which a board of five members, to be known as the board of higher curricula, is to be appointed by the governor. The duties of this board are to be the prevention of duplication of studies or departments in the higher educational institutions of the State, viz, the agricultural college and the State university. The board is empowered to determine and define the courses of study to be offered by each institution and the departments to be conducted, and after investigation and twenty days' notice may direct the elimination of any duplicating courses or departments.

C. C. Cate, assistant plant pathologist in the station, has been succeeded by H. S. Jackson, Austin Teaching Fellow at Harvard and formerly of the Delaware Station.

Pennsylvania College.—A convention of the State Millers' Association was held at the college, September 8–10, with addresses by several of the college staff.

Washington College and Station.—A feedstuffs law was enacted by the last legislature, the enforcement of which is to rest with the director of the station. The expenses of the inspection are to be defrayed by the sale of stamps or labels.

The most complete demonstration train yet sent out from the college traversed western Washington during the last of June. The outfit included a specially equipped car for dairy stock and a milking machine in operation; a horticultural car containing several orchard trees with which demonstrations were given of horticultural practice and spraying operations, an extensive horticultural library, and appliances for the marketing of orchard crops; a poultry car fitted up with small models of approved poultry buildings, incubator houses, brooder houses, etc.; and a dairy car containing bottling apparatus, milk coolers, cream separators, and other dairy apparatus. The cars were lighted by a special apparatus such as can be readily installed in farm homes.

Dr. W. E. Ralston has been relieved of his duties as assistant veterinarian of the station in order that he may devote his entire time to instruction in the college. Recent appointments include the following: D. J. Kraus, formerly of the Bureau of Entomology of this Department, assistant in entomology, beginning September 1; Rex N. Hunt, a graduate of the Washington College and postgraduate student of the University of California, assistant botanist, beginning July 15; Walter L. Hadlock, a graduate of the University of Nebraska, assistant chemist, beginning September 1; and W. H. Hein, formerly of the Nebraska University and Station, assistant horticulturist, beginning August 1.

Wisconsin University and Station.—In accordance with an act passed by the last legislature, a soil survey of the State is to be made in cooperation with the State geological and natural history survey and the Bureau of Soils of this Department, as a means to ascertain the character and fertility of the developed and undeveloped soils of the State, the extent and practicability of drainage of swamp and wet lands, and the means for conserving and increasing the fertility of the soils. An appropriation of $10,000 annually for the ensuing biennium has been made for this work.

A seed-inspection law has been enacted and went into effect July 1. The station is charged with the enforcement of the act, and A. L. Stone has been appointed seed inspector.

Dry Farming Demonstrations in Wyoming.—An appropriation of $5,000 per annum was made by the last legislature for the carrying on of demonstrations relative to the adaptability of the soil and climatic conditions for the production of different classes of grain and grasses, shade, ornamental, and fruit trees. The work is to be under the supervision of a board of three men, to be appointed by the governor, and of a director of experiments to be designated by the board. A report of the results secured must be rendered prior to December 1, 1910.

Summer Institutes for Farmers.—The Superintendent of Farmers' Institutes for Minnesota has inaugurated a system of "schoolhouse" institutes to be conducted by one speaker, assisted by local farmers, for two or three meetings in each district. A twelve weeks' lecture institute has already been held in connection with the high school at Cokato and an eight weeks' course at Cannon Falls. A fee of $2 was charged for these courses. About thirty institutes, primarily for women, are also to be conducted during the season, including such topics as gardening, fruit growing, poultry raising, country schools, care of milk, and home economics.

Second International Congress of Alimentary Hygiene.—The next meeting of this Congress will be held at Versailles, in October, 1910. The congress will be organized into seven sections, as follows: Biological physics; physiology and physiological chemistry; alimentary hygiene, bacteriology, and parasitology; composition, analysis, and adulteration of foods and dairy products; potable waters; legislation, repression of frauds, inspection, and statistics; and the teaching and popularization of rational alimentation and hygiene. Dr. N. Zuntz will act as secretary of the section on physiology and physiological chemistry.

Agriculture at the University of Chicago.—Two courses in agricultural education have been conducted during the university summer quarter by Dr. B. M. Davis, who was instrumental several years ago in developing courses in agriculture at the California State Normal School at Chico, and is now in charge of the department of agriculture at Miami University.

Agricultural Work in the College of Idaho.—The College of Idaho, located at Caldwell, is to enlarge its faculty and the extent of its courses, as the result of recent increases in endowment. Among the new courses to be offered is one in

theoretical agriculture which will include the chemistry of the soil, diseases of plants and orchards, and entomology. Additional courses will also be offered in biology, geology, and botany.

A Colonial Training Farm in England.—A recent number of *Farm Life* announces the establishment last September, by a well-known firm of shipping agents in London, of Craig Wood Lodge Colonial Training Farm at Horsted Keynes, Sussex County, England, for the purpose of testing the capacity and fitness of young men wishing to go to the colonies. The farm comprises 20 acres and is said to be well equipped with live stock, poultry, fruit, kitchen garden, etc. At present there are accommodations for 15 pupils. The instruction is entirely practical, covering the elements of mixed and dairy farming. The course extends over two months, and if at the end of that time the pupil is found adapted to colonial farming, the firm undertakes to place him with a reliable farmer in Canada or Australia.

State Laboratories for the Manufacture and Distribution of Hog-Cholera Serum.—The Illinois legislature has appropriated $4,000 for the purchase of at least 40 acres of land, $20,000 for the erection and equipment of a suitable laboratory, and $6,000 annually for maintenance of what is to be known as the State biological laboratory. This will be under the management of the State board of live stock commissioners. The hog-cholera serum and other biological materials produced in the laboratory are to be distributed free of charge to stock raisers in the State.

The Missouri legislature has made an appropriation of $10,000 for the development and distribution of hog-cholera serum in that State.

New Journals.—*Mededeelingen van de Rijks Hoogere Land-, Tuin- en Boschbouwschool* is an illustrated publication which is to be issued at irregular intervals by the Royal High School of Agriculture, Horticulture, and Forestry and affiliated institutions, at Wageningen, Netherlands. The initial number contains the following articles: The Excretion of Acids by Roots, by J. H. Aberson; The Catalase Reaction in Milk, by J. van Haarst; A Report of Investigations Conducted by the Phytopathological Institute During 1907, by J. Ritzema Bos; Report of a Test of Machines for Distributing Chile Saltpeter, by S. Lako; and "Tulipthieves" and "Oneleaves," by B. A. Plemper van Balen.

Annales des Falsifications is a monthly designed to constitute an international journal as to the repression of fraud in food and drugs. It is issued under the patronage of the White Cross Society of Geneva, with C. Franche as editor, assisted by a corps of collaborators from the various countries, among them being Drs. Wiley, Bigelow, and Jenkins, and J. Q. Emery from the United States. Each number is to contain original articles, abstracts, notes, accounts of legislation, etc. The principal article in the initial number deals with the detection of adulteration in coco and chocolate.

The Southwest Monthly is being published at Pulaski, Va. The initial number is very largely devoted to agricultural topics, the articles including The Problem of the Rural Woman, by Dr. J. P. McConnell, of Emory and Henry College; The New Country School as a Force in the Enrichment of Rural Life, by F. B. Fitzpatrick, principal of the Pulaski schools; A Comparison Between Hood River, Oregon, and Virginia in Apple Culture, by Director S. W. Fletcher, of the Virginia Station; and The Relation of Live Stock to Successful Agriculture, by Dr. W. J. Quick, of the Virginia College and Station.

Southern Woodlands, the bimonthly published by the Georgia Forest Association, began its third volume in June under the new name *Forest, Fish and Game*. The change was made to emphasize the relation between forest preservation and the perpetuation of fish and game, and to bring the work of the

Forest Association into touch with the Georgia Game and Fish Protective Association, which was recently formed in Atlanta.

Boletín de Agricultura Técnica y Económica has been established as the monthly organ of the Spanish Ministry of Agriculture, Industry, and Commerce. The initial numbers are largely statistical, but also contain entomological and other studies, brief abstracts of current publications, a catalogue of the agricultural library of the department, etc.

Zeitschrift für Botanik is being issued as a monthly. Each number will contain original articles, reviews, and a list of recent publications in the various lines of botanical work. The original article in the initial number is on The Influencing of the Flowering of Orchids Through Dusting and Other Conditions.

The Ohio State Department of Agriculture is issuing a series of official bulletins monthly, or oftener. The initial number contains a crop and live stock statistical report, lists of fertilizers and feed stuffs registered for 1907, analyses of fertilizers and feed stuffs, and miscellaneous data.

The Dairy Bulletin is a monthly journal devoted to the dairy interests of northern Ohio. The initial number contains an article on Dairying in American Agriculture, by Oscar Erf of the Ohio University.

Ion, a monthly journal of electronics, atomistics, ionology, radioactivity, and raumchemistry, is being published at London.

Miscellaneous.—Walter S. Buchanan, a graduate of the Tuskegee Institute and of the Bussey Institution, has been appointed president of the Agricultural and Mechanical College for Negroes, at Normal, Ala.

The Agricultural and Mechanical College for the Colored Race at Greensboro, N. C., was granted an annual appropriation of $10,000, together with $4,350 annually for the ensuing biennium for repairs, improvements, and sewerage.

W. S. Sowder has been appointed professor of agriculture in the Arkansas State Normal School at Conway, in place of L. A. Niven, who goes to a similar position at the Winthrop Normal College, Rockhill, S. C.

Census and Statistics Monthly gives the organization of the Canadian department of agriculture and a description of various phases of its work.

Deutsche Landwirtschaftliche Presse for June 16 contains an illustrated account of the work and equipment of the Royal Agricultural Experiment Station at Möckern.

An agricultural chamber was formally established at Chiapas, Mexico, May 30, under the presidency of Ernesto E. Gutierrez.

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EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. KNIGHT.

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EXPERIMENT STATION RECORD.

VOL. XXI. SEPTEMBER, 1909. No. 4.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY.

Annual reports on the progress of chemistry for 1908 (*Ann. Rpts. Prog. Chem. [London], 5 (1908), pp. VIII+295, figs. 3*).—This is the fifth volume of this series of reviews of progress in chemistry issued by the London Chemical Society. As heretofore, it includes reports on general and physical chemistry by A. Findlay, inorganic chemistry by H. Marshall, organic chemistry by C. H. Desch and G. T. Morgan, analytical chemistry by A. R. Ling, physiological chemistry by W. D. Halliburton, agricultural chemistry and vegetable physiology by A. D. Hall, and crystallography by W. J. Pope.

The section on agricultural chemistry and vegetable physiology reviews investigations in soil bacteriology, chemistry, and physics; chemistry of the growing plant; manures and manuring; chemistry of animal nutrition; and chemical analysis. It is stated that during the year the activity of the many workers in the varied field of agricultural chemistry and vegetable physiology "has been well maintained, although nothing very novel has come to light either in the way of a discovery or a new point of view."

Colloid chemistry and some of its technical aspects, J. ALEXANDER (*Jour. Soc. Chem. Indus., 28 (1909), No. 6, pp. 280–285, fig. 1*).—The relation of colloid chemistry to clay and pottery, plaster of Paris, boiler scale, soils and fertilizers, electroplating and electrodeposition of metals, metallurgy, dyeing, soap, milk, ice cream, confectionery, filtration, and chemical analysis is discussed, with numerous references to literature.

The relation of colloids to agricultural chemistry, P. EHRENBERG (*Ztschr. Chem. u. Indus. Kolloide, 3 (1908), pp. 193–206; abs. in Chem. Zentbl., 1909, I, No. 7, p. 572*).—The author discusses, on the basis of the older as well as the more recent literature of the subject, the importance of colloids in relation to the physical, chemical, and bacteriological properties of soils, and shows that the results of more recent investigations relating to colloids may greatly aid in solving problems in agricultural chemistry.

Weathering in the light of colloid chemistry, F. CORNU (*Ztschr. Chem. u. Indus. Kolloide, 4 (1909), No. 6, pp. 291–295*).—This article points out certain applications of colloid chemistry in surface and secular weathering, and in oxidation, cementation, and decomposition processes.

Contributions to the knowledge of plant phosphatids (*Ztschr. Physiol. Chem., 58 (1909), No. 6, pp. 500–525; abs. in Chem Zentbl., 1909, I, No. 12, pp.*

1020 1022).—A continuation of previous work (E. S. R., 20, p. 110), and including the following articles: A Phosphatid from *Lupinus albus*, by E. Winterstein and L. Stegmann; A Phosphatid Prepared from Wheat Meal, by E. Winterstein and K. Smolenski; On the Preparation of Phosphatids from Wheat Germs, by K. Smolenski; and On a Phosphorus Constituent of the Leaves of Ricinus, by E. Winterstein and L. Stegmann.

The methods of obtaining phosphatids from these plants are given in detail.

Tables for calculating phosphoric acid from magnesium pyrophosphate, O. Göltschke (*Tabelle zur Umrechnung der pyrophosphorsauren Magnesia auf Phosphorsäure. Brunswick, 1908, pp. 7; rev. in Chem. Ztg., 33 (1909), No. 43–44, p. 401*).—The calculations are made for each half milligram from 0.5 gm. of magnesium pyrophosphate upward, the coefficient used being 0.63757.

Simplification of the determination of hardness in water, E. E. Basch (*Jour. Gasbeleucht., 52 (1909), pp. 145, 146; abs. in Chem. Zentbl., 1909, I, No. 15, pp. 1264, 1265*).—This article suggests modifications of the methods of Telle (E. S. R., 21, p. 8) and of Boutron and Boudet by which hardness may be quickly measured by the number of drops of soap solution required.

Colorimetric determination of dissolved oxygen in water, G. B. Frankforter, G. W. Walker, and A. D. Wilhoit (*Jour. Amer. Chem. Soc., 31 (1909), No. 1, pp. 35–43, fig. 1*).—The method proposed is based upon the change in color of cuprous ammonium chlorid when brought in contact with oxygen. A special form of apparatus in which a solution of pure colorless cuprous ammonium chlorid can be prepared and kept ready for use at all times is described.

The interpretation of a water analysis (*Mo. Bul. N. Y. State Dept. Health, 25 (1909), No. 4, pp. 92–94*).—The significance of the determination of albuminoid and free ammonia, oxygen consumed, nitrites and nitrates, chlorin, and bacteriological analysis is explained. The author concludes "that except in those cases where fecal pollution is entirely absent, a sanitary analysis can seldom definitely establish the fact that a given sample of water is from a supply which is either entirely safe or absolutely dangerous. It can point out probable danger, and as such is an aid to be used in connection with other sources of information."

On the quantitative determination of the soot content of air, G. Orsi (*Arch. Hyg., 68 (1908), No. 1, pp. 10–21; abs. in Chem. Zentbl., 1909, I, No. 5, p. 401*).—The author found Rubner's method for the determination of the soot content of air to be practical and easily carried out. A Weber photometer was successfully used. The soot content was found to vary widely with the weather, rain being more active in purifying the air than snow, and fog holding soot firmly. The soot content was found to be greatest in the morning.

The determination of the germ content of the air, Kühl (*Pharm. Ztg., 54 (1909), No. 31, pp. 308, 309, fig. 1*).—A simple method for drawing a known volume of air through nutrient gelatin and so ascertaining the germ content is described.

The accuracy of the determination of various forms of nitrogen in soil extracts, Densch (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 1 (1908), No. 2, pp. 207; abs. in Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 14–17, p. 420*).—The results of tests which tend to show the inaccuracy of methods commonly employed are summarized.

The estimation of some organic plant acids, G. Jörgensen (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 7, pp. 396–412*).—An extended study of methods together with the results of numerous analyses.

The biuret reaction and the cold nitric acid test in the recognition of protein, K. H. van Norman (*Bio-Chem. Jour., 4 (1909), No. 3–4, pp. 127–135*).—In a watery solution of albumin the limit of delicacy of the biuret reaction is "0.0004 per cent, or 4 parts of albumin in 1,000,000 parts of distilled water.

"In albuminous urine diluted with distilled water [it] is 0.001 per cent, or 1 part of albumin in 100,000 parts of urine and distilled water."

In the case of the cold nitric acid tests the limit of delicacy "in a water solution of albumin is 0.00006 per cent, or 6 parts of albumin in 10,000,000 parts of distilled water.

"In albuminous urine diluted with urine free from albumin [it] is 0.0002 per cent, or 2 parts of albumin in 1,000,000 parts of urine."

Determination of ash when proteid preparations have been added to meat goods, E. FEDER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 4, pp. 191–194*).—From the analytical data reported the author concludes that the determination of the calcium content of the ash is of importance in estimating whether proteid preparations of similar composition have been added to meat goods, and that it is possible from the data obtained to judge of the amount of such addition. Since alkali is almost always used in making commercial proteid preparations, it is also of importance to determine the alkalinity of the ash.

Estimation of phosphoric acid in foods, E. WÖRNER (*Südd. Apoth. Ztg., 1908, p. 586; abs. in Pharm. Praxis, 7 (1908), No. 8, p. 363*).—In the method described the material is heated with a mixture of sulphuric and nitric acids, and the phosphorus precipitated with ammonium molybdate, dissolved in sodium hydroxid solution, and titrated with sulphuric acid.

On the determination of mineral constituents in vegetables, L. VUAFLART (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 638, II, pp. 221–229*).—A discussion of methods.

Honey, H. LÜHRIG and A. SARTORI (*Jahresber. Chem. Untersuch. Amt. Breslau, 1907–8, p. 43; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 1, p. 59*).—The authors' conclusion is that the ash content is of less value than is usually believed in determining the purity of honey, as there are natural honeys with lower ash content than the minimum legal requirement. They conclude further that the Ley and the Fiehe reactions give satisfactory results with honey mixtures when artificial honey constitutes only one-third or less of the total.

Judging honey, H. LÜHRIG (*Pharm. Zentralhalle, 50 (1909), No. 18, pp. 355–360*).—Analytical data are reported and discussed with special reference to the Fiehe and the Ley reactions.

Concerning the Fiehe reaction, E. VON RAUMER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 3, pp. 115–125*).—According to the experimental data reported, it appears that the Fiehe reaction does not show whether or not honey is adulterated with invert sugar since a number of genuine honeys of foreign origin but which had been heated gave the reaction, as did also pure fructose which had been heated. The constituent which gives the reaction is volatile with ether vapor by rapid evaporation.

Critical studies of the Fiehe reaction, M. KLASSERT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 3, pp. 126–128*).—The Fiehe reaction, according to the author, only shows that the sample of honey has been wholly or in part heated to a high temperature. Definite conclusions regarding the character of a honey necessitate thorough investigation and in many cases the nitrogen and phosphoric acid content must be determined.

Albuminates in natural and artificial honey, R. LUND (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 3, pp. 128–130*).—In the natural honeys examined the nitrogenous material ranged from 0.34 to 0.43 per cent as compared with 0.06 to 0.16 per cent in artificial honey. The amount of precipitate obtained with tannic acid offers a convenient means of judging of the amount of nitrogenous material present.

The identification of artificial honey, A. JÄGERSCHMID (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 3, pp. 113–115*).—That the color reaction obtainable with resorcin and hydrochloric acid is probably due to the presence of caramel is the author's conclusion drawn from the studies reported.

Judging the products of bees fed on sugar, NEUBAUER (*Rheinische Bienenztg., 59 (1908), pp. 110–113; abs. in Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 1, p. 58*).—The author protests against designating as honey the products of bees fed on sugar.

Vinegar chemistry with special reference to methods of analysis, J. BRODE and W. LANGE (*Arb. K. Gsndhtsamt., 30 (1909), No. 1, pp. 1–54; abs. in Ztschr. Angew. Chem., 22 (1909), No. 16, pp. 742, 743*).—The estimation of acetic acid, the detection of stronger acids and of preservatives, and other analytical questions are considered.

The estimation of caffein in coffee, K. LENDRICH and E. NOTTBOHM (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 5, pp. 241–265, dgm. 1*).—An extended critical study of methods of estimating caffein, with analyses of a large number of samples.

Judging coco powder and powdered chocolate, M. GRESHOFF (*Pharm. Weekbl., 46 (1909), Nos. 13, pp. 301–314, pl. 1; 14, pp. 323–326*).—An extended digest of data on the examination and judging of these goods with special reference to legal requirements.

Quantitative estimation of formic acid in fruit juices, F. SCHWARZ and O. WEBER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 4, pp. 194–197*).—In the method which the authors recommend the solution is treated with decinormal sodium hydroxid solution, distilled with steam, and titrated, using phenolphthalein as an indicator. After evaporation to dryness, the material is dissolved in water, oxidized with potassium bichromate and sulphuric acid, boiled for 10 minutes with an inverted condenser, cooled, distilled, and again titrated.

The determination of benzoic acid in tomato catsup and other food products, R. M. WEST (*Jour. Indus. and Engin. Chem., 1 (1909), No. 3, pp. 190–194, fig. 1*).—A study of methods in which a modified form of apparatus is described for removing benzoic acid from the sample by distillation with steam.

The determination of benzaldehyde in almond flavoring extract, W. DENIS and P. B. DUNBAR (*Jour. Indus. and Engin. Chem., 1 (1909), No. 4, pp. 256, 257*).—A study of methods.

The chemical and microscopical examination of spices with reference to quality, E. SPAETH (*Pharm. Zentralhalle, 49 (1908), Nos. 27, pp. 517–523; 28, pp. 539–547; 29, pp. 569–572; 30, pp. 581–588; 31, pp. 601–609; 32, pp. 626–632; 33, pp. 648–661; 34, pp. 673–684; 35, pp. 698–706; 36, pp. 718–729*).—An exhaustive summary and discussion of the subject.

A method for the detection of small quantities of capsicum in ginger ale and other preparations of ginger, C. H. LA WALL (*Amer. Jour. Pharm., 81 (1909), No. 5, pp. 218, 219*).—The method outlined depends upon extraction with ether and saponification with alcoholic potassium hydroxid solution. The saponified material is again extracted with ether which is allowed to evaporate spontaneously. If capsicum is present, the residue will have a sharp taste, while ginger gives only a slight camphorlike taste.

The detection of caramel in wine, cognac, and beer, A. JÄGERSCHMID (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 5, p. 269*).—The method of detecting caramel depends upon color reactions with resorcin and hydrochloric acid, and with acetone and hydrochloric acid.

The estimation of malic acid in wine, C. VON DER HEIDE and H. STEINER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 6, pp. 307–315*).—A

study of methods from which general conclusions are drawn regarding the determination of organic acids in wine.

The estimation of succinic acid in wine, C. VON DER HEIDE and H. STEINER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 6, pp. 291–307*).—A critical study of methods. The authors state that they purpose continuing studies of the formation of succinic acid in fermenting musts.

The volumetric determination of sulphuric acid in wine, C. BLAREZ and L. CHELLE (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 8, pp. 690–693*).—The method described is preferred by the authors to the gravimetric method, as they consider it quicker and just as reliable.

Determination of tartaric acid in wines, MESTREZAT (*Jour. Pharm. et Chim., 6. ser., 29 (1909), No. 1, pp. 9–15; abs. in Analyst, 34 (1909), No. 396, p. 104*).—The author has obtained better results with the evaporation methods than with the precipitation methods. A method is described in which duplicate analyses are concordant to 0.5 per cent and in which the presence of malic acid, succinic acid, and sugar has been proved to be without influence on the result.

Studies on stout, N. VAN LAER and J. D. WILSON (*Wchnschr. Brau., 26 (1909), No. 1, pp. 6–9; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 3, p. 155*).—The authors have found lactic-acid bacteria in stout, but they differ from those found in milk, as they soon die in the presence of the acid which they have produced.

Progress in the chemistry of fermentation industries for the year 1908, O. MOHR (*Ztschr. Angew. Chem., 22 (1909), Nos. 14, pp. 625–630; 15, pp. 674–676*).—This is a digest of the literature on the subject.

Contribution to the judging of milk by means of the refractive power of milk serum, T. HENKEL (*Molk. Ztg. Berlin, 18 (1908), No. 52, pp. 613–616; abs. in Milchw. Zentbl., 5 (1909), No. 3, pp. 131, 132*).—The author determined the refractive power of 2,093 samples of milk serum. There appear to be many factors which influence the result, but as a rule the refractive power is a correct indication of the amount of solids-not-fat.

Comparison of some methods of determining the fat content of milk, A. STEIN (*Milchw. Zentbl., 5 (1909), No. 5, pp. 209–217*).—The average percentage of fat in 34 samples of raw milk as determined by the Gerber method was 3.636, by the Liebermann-Szekely method 3.588, and by the Soxhlet method 3.509. In milk preserved with formaldehyde the corresponding figures were 3.649, 3.597, and 3.491 per cent, respectively.

The determination of the fat content of milk by the Röse-Gottlieb method, C. HUYGE (*Rev. Gén. Lait, 7 (1909), No. 12, pp. 265–272*).—The author found that in determining the percentage of milk fat by this method the upper layers of the ether-fat solution were richer in fat than the lower layers.

The determination of milk fat and coconut fat, M. MONHAUPT (*Chem. Ztg., 33 (1909), No. 34, pp. 305, 306; abs. in Analyst, 34 (1909), No. 398, p. 212*).—The author made a comparison of the Kirschner method of separating the volatile insoluble fatty acids with the Reichert-Meissl and Polenske values, and thinks that the Kirschner and the new Reichert-Meissl values promise to be of great service in testing butter mixtures.

Calorimetric constant of Argentina butter, E. H. and L. H. DUCLOUX (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 5 (1909), pp. 93–105, map 1*).—The heat of combustion of a number of samples of butter was determined and compared with other constants. As a result of their investigations the authors conclude that the heat of combustion is a constant which is of value for the judging of the purity of butter.

On the application of the Gottlieb method for the determination of fat in cheese, A. G. PALMQUIST (*Svensk Kem. Tidskr., 21 (1909), No. 4, pp. 92–95*).—

According to the author, this method seems to be simple and expedient for quantitatively separating the neutral fats from the free fatty acids, but it is not adapted for the determination of fat in cheese, as the free fatty acids are thereby lost.

A butter and cheese tester, M. VOGTHERR (*Ztschr. Offentl. Chem., 15 (1909), No. 2, pp. 21–28, figs. 3*).—This is a description of new forms of testing bottles for determining the percentage of water and fat in butter and cheese. The reagents used are sulphuric acid and amyl alcohol.

An apparatus for measuring acidity in cheese making and butter making, C. A. PUBLOW (*New York Cornell Sta. Circ. 7, pp. 17–20, fig. 1*).—This circular describes an acidimeter for measuring the acidity of milk, and contains detailed directions for its use.

Fat analyses and the chemistry of fats in the year 1908, W. FAHRION (*Ztschr. Angew. Chem., 22 (1909), No. 17, pp. 769–778*).—This is a digest of the literature on this subject.

Contribution to the knowledge of the glycerids of fats and oils, A. BÖMER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 7, pp. 353–396, fig. 1, dgm. 1; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 9, p. 482*).—This is a continuation of previous work (E. S. R., 19, p. 611). The properties of the different fractions obtained from mixtures of the glycerids of palmitic and stearic acids obtained from mutton tallow are presented in tabular form. Mutton tallow contains between 4 and 5 per cent each of dipalmitostearin and of palmitodistearin. The presence of tripalmitin could not be proved.

Hydrolysis of fats by means of pancreas, E. BAUR (*Ztschr. Angew. Chem., 22 (1909), No. 3, pp. 97–100; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 3, pp. 149, 150*).—Experiments in hydrolysis of fats with the pancreas of the pig are described, and the author thinks that pancreatic hydrolysis of fats might be used to advantage in the serum industry. "It has the advantage over hydrolysis with castor seeds that the reaction is complete, whereas with the latter only about 90 per cent of the fatty acids are liberated. On the other hand, castor seeds are cheaper and more easily dealt with than the pancreatic glands of animals."

The determination of the thermal value of fats and oils, M. TORTELLI (*Chem. Ztg., 33 (1909), Nos. 15, pp. 125, 126, figs. 2; 16, pp. 134, 135; 20, pp. 171, 172; 21, pp. 184, 185; abs. in Analyst, 34 (1909), No. 397, p. 168*).—The author reports thermal values for a number of oils as obtained by mixing 20 cc. of each oil with 5 cc. sulphuric acid in a vacuum-jacketed tube. These values, which are constants if proper precautions are taken, is also a measure of the iodin value of a fat.

The identification of sesame oil by means of colored reactions with aromatic aldehydes, C. FLEIG (*Ann. Chim. Analyt., 14 (1909), No. 4, pp. 132–138*).—A description of methods and results obtained with pure sesame oil and with mixtures.

Some African oils and oil seeds (*Bul. Imp. Inst., 6 (1908), No. 4, pp. 353–380; abs. in Analyst, 34 (1909), No. 397, pp. 164, 165*).—This is a summary of analytical data selected from reports to the Colonial and Indian governments by the director of the Imperial Institute.

Notes on some Argentina olive oils, E. H. and L. H. DUCLOUX (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 5 (1909), pp. 153–159*).—Analytical data are reported and the results are compared with those of other investigators.

Determination of essential oils, M. KLASSERT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 3, pp. 131, 132, fig. 1; abs. in Analyst, 34 (1909), No. 397, p. 168*). This is a description of a method of evaporating an ethereal solution of an essential oil by which there is little risk of loss of the volatile oil.

The chemistry of essential oils and artificial perfumes, E. J. PARRY (*London, 1908, 2. ed., rev. and enl., pp. VIII+546, figs. 21*).—This second edition (E. S. R., 11, p. 618), has been thoroughly revised and enlarged to include recent researches. A chapter on terpeneless oils has been omitted and an appendix, which gives the requirements of the principal pharmacopœias, has been added. There is a brief treatment of general methods of preparation and analysis of essential oils and the mixture of the compounds contained therein. The main part of the book consists of a systematic study of oil-producing plants and special methods of preparation. Considerable emphasis is given to the variation in the properties of oils produced by differences in soil, climate, and general conditions of growth.

Perfume plants, P. HUBERT (*Plantes a Parfums. Paris, 1909, pp. XII+610, figs. 172*).—This is a treatise on the technology of perfumes. The first part is devoted to the chemistry and manufacture of perfumes. In the second part the cultivation and preparation of each perfume-producing plant is described in detail. The third part consists of a directory of officials in the French colonies and of dealers in perfumes and materials used in their production.

The determination of fatty acids in soaps, G. FENDLER and L. FRANK (*Ztschr. Angew. Chem., 22 (1909), No. 6, pp. 252–261, figs. 3; abs. in Analyst, 34 (1909), No. 397, p. 166*).—This is a discussion and description of methods.

Oleaginous products, T. E. HEENAN ET AL. (*Mo. Cons. and Trade Rpts. [U. S.], 1909, No. 344, pp. 153–160*).—Consuls from China, Great Britain, India, Turkey, and Mexico report present trade tendencies in vegetable oils from their respective stations. Improved methods have been devised for obtaining oil from the soy bean, which is the principal product of Manchuria. Large shipments have recently been sent to England, where the oil is used as a substitute for cotton-seed oil and the residue is converted into cattle feeds.

In India, ghee made from cow's milk is preferred to butter by the masses of the Hindus, and formerly sold for 25 per cent more than butter. Within the past 2 years the price of ghee has increased more than 125 per cent. There is a good opening for the sale of a substitute for ghee made from cotton-seed oil.

The past 2 years the olive crop has been a partial failure in Turkey, and recently the government prohibition has been removed from the importation of cotton-seed oil. It is thought that a good trade can be developed in cotton-seed and oleo oils from the United States. The consular agent of Oaxaca, Mexico, writes that the lowlands of Mexico afford a rich field for the palm-oil industry and describes a recent invention for hulling the nut.

Thirteenth annual convention of the Interstate Cotton-Seed Crushers' Association (*Nat. Provisioner, 40 (1909), No. 21, pp. 20–54L; Oil, Paint and Drug Reporter, 75 (1909), No. 21, pp. 28C–28X*).—This is an account of the proceedings of the association, which met at Memphis, Tenn., May 18 to 20. Many papers were presented of practical value to those engaged in the cotton-seed products industry. Among these, methods of sampling and analyzing cotton-seed products were discussed, and papers were presented on the desirability of a uniform moisture basis for reporting analytical results, and on the increased value to the planter and oil mills by seed development. A paper by A. M. Soule is noted on page 367 of this issue.

The investigation of molasses feeds, M. GONNERMANN (*Ztschr. Öffentl. Chem., 15 (1909), No. 6, pp. 101–107*).—A discussion of methods.

Miscellaneous [analyses], A. W. BLAIR (*Florida Sta. Rpt. 1908, pp. XLIV–XLVII*).—Analytical data are reported on *Mucuna lyoni*, velvet beans, Kennedy lemon, mangoes, beggar weed, Mexican clover, wild-grass hay, sweet-potato vines, pineapples, and avocados.

[Miscellaneous analyses]. A. M. Peter, S. D. Averitt, and O. M. Shedd (*Kentucky Sta. Rpt. 1906, pp. 259–262*).—Analyses are reported of evaporated distillery slop, butter, arsenate of lead, dike rock, boiler compounds for preventing scale in boilers, and petroleum for oiling roads.

Annual report for 1908 of the consulting chemist, J. A. Voelcker (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 295–307*).—This report consists chiefly of analytical data on feeding stuffs, fertilizers, sewage sludge, soils, and other products.

Report on the activity of the agricultural experiment station of Saxon Upper Lusatia at Pommritz for the year 1908, Loges (*Ber. Agr. Chem. Vers. Stat. Pommritz, 1908, pp. 7*).—Analytical data of fertilizers, feeding stuffs, milk, milk products, and other agricultural substances are reported.

METEOROLOGY—WATER.

The climatic importance of forests, Schwappach (*Ztschr. Balneol., Klimat. u. Kurort Hyg., 1909, No. 10; abs. in Umschau, 13 (1909), No. 20, p. 433*).—The influence of forests in equalizing temperature, increasing the humidity of the air in summer, moderating air currents, controlling the soil water level and the flow of springs and streams, and preventing erosion is discussed.

The fertilizing value of rain and snow, F. T. Shutt (*Canada Expt. Farms Rpts. 1907, pp. 173–176; Proc. and Trans. Roy. Soc. Canada, 3. ser., 2 (1908–9), Sect. III, pp. 181–185*).—A report on previous work on this subject has been noted (E. S. R., 20, p. 15). The present report includes additional data, extending the observations over 12 months ending with February, 1908.

The data reported show that the nitrogen in the rain and snow at Ottawa during the year was 4.32 lbs. per acre. Of this 74 per cent was in the form of ammonia and ammonium salts, and 26 per cent in the form of nitrates and nitrites. The total precipitation during the period was 37.35 in., of which 24.05 in. fell as rain and 13.3 in. (the equivalent of 133 in. of snow) in the form of snow. It is estimated that approximately 75 per cent of the nitrogen in the total precipitation was furnished by the rain.

Evaporimeter records (*Florida Sta. Rpt. 1908, pp. XV, XVI*).—Partial records are given of evaporation at 4 different places on the horticultural grounds of the station from July 1, 1907, to July 13, 1908.

Meteorological summaries for the year 1906 (*Kentucky Sta. Rpt. 1906, pp. 279–282*).—Summaries are given of observations on temperature, pressure, precipitation, cloudiness, and wind movement.

Meteorological summaries for the year 1907 (*Kentucky Sta. Rpt. 1907, pp. 209–212*).—Summaries are given of observations on temperature, pressure, precipitation, cloudiness, and wind movement.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. Ostrander and R. C. Lindblad (*Massachusetts Sta. Met. Buls. 245, 246, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during May and June, 1909. The data are briefly discussed in general notes on the weather of each month.

Weather report, W. H. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 43–50*).—Summaries are given of observations at Guelph and other places in the Province of Ontario during 1908 on temperature, precipitation, wind, and injury from lightning. Attention is called particularly to the climatic conditions of the Abitibi region, about 350 miles north of Toronto, with special reference to the agricultural possibilities of the region.

Annual report of the director of the [Philippine] Weather Bureau for the year 1906 (*Ann. Rpt. [Philippine] Weather Bur., 1906, pt. 1, pp. 153*).—This is a tabular record of meteorological observations made during the year at the central observatory at Manila.

Climatology, L. MORANDI (*An. Estad. Uruguay, 20 (1907–8), pt. 1, pp. 4–28, pls. 12*).—This is the meteorological report of the National Physico-Climatological Institute of Montevideo for the year 1907, and includes summaries of observations on temperature, pressure, rainfall, humidity, and cloudiness at various places in Uruguay. The data are given in tables and also fully presented in the form of charts and diagrams.

The weather of 1908 in Switzerland, R. BILLWILLER (*Schweiz. Ztschr. Forstw., 60 (1909), Nos. 2, pp. 51–57; 4, pp. 112–116*).—A summary of observations on temperature, pressure, rainfall, and sunshine is given as usual in the form of tables and monthly notes.

Water-supply investigations in the Yukon-Tanana region, Alaska, 1907 and 1908, C. C. COVERT and C. E. ELLSWORTH (*U. S. Geol. Survey, Water-Supply Paper No. 228, pp. 108, pls. 7, figs. 3*).—This paper describes conditions and reports results of stream measurements in the Fairbanks, Circle, and Rampart districts, covering the drainage systems of an area of about 4,200 square miles. The paper also discusses hydraulic development in the region.

Surface water supply of Nebraska (J. C. STEVENS (*U. S. Geol. Survey, Water-Supply Paper No. 230, pp. 251, pls. 6, figs. 5*).—This is a compilation of all discharge data collected in Nebraska, containing also discussions of units and methods of stream measurements, accuracy and reliability of stream flow data, and relation of rainfall to run-off.

It is shown that "the streams of the western plains differ markedly with respect to the relation between rainfall and run-off from streams in other portions of the United States, and formulas elsewhere applicable are wholly inadequate and may lead to gross errors."

Geology and water resources of the Harney Basin region, Oregon, G. A. WARING (*U. S. Geol. Survey, Water-Supply Paper No. 231, pp. 93, pls. 5*).—This report deals in the usual way with the geography, geology, physiography, and surface and underground waters of the region, with detailed accounts of the several basins included in the area. There are also short sections relating to temperature of underground water and well-sinking methods and costs.

Some desert watering places in southeastern California and southwestern Nevada, W. C. MENDENHALL (*U. S. Geol. Survey, Water-Supply Paper No. 224, pp. 98, pls. 4*).—This paper describes the mineral resources, industrial development, physical features, climate, and water supply of the region, gives hints on desert traveling, and contains information regarding the main routes of travel, irrigating and artesian waters, and springs.

Mineral waters, A. M. PETER, S. D. AVERITT, and O. M. SHEDD (*Kentucky Sta. Rpt. 1906, pp. 262–278*).—Analyses of samples from different parts of Kentucky are reported.

Analyses of mineral waters, S. D. AVERITT and O. M. SHEDD (*Kentucky Sta. Rpt. 1907, pp. 197–208*).—Analyses of samples from different parts of Kentucky are reported.

Well waters from farm homesteads, F. T. SHUTT (*Canada Expt. Farms Rpts. 1907, pp. 179–181*).—Analyses of 65 samples are reported and classified as follows: "Good and wholesome, 26; suspicious and probably dangerous, 18; seriously polluted, 12; saline, 9. The tabulated data are appended."

The inspection of domestic wells, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 149, pp. 21, figs. 4, dgms. 3*).—This bulletin discusses the sources, means of prevention, and detection of contamination of wells, and summarizes the

results of examinations of 730 samples of well water collected chiefly within the drainage area of the Ottawa Valley with a view to determining their normal chlorin content and the possibility of using this determination as a means of detecting contamination.

More complete analyses, showing not only chlorin but also alkalinity and total, permanent, and temporary hardness, are reported for 32 wells each in the towns of Weston and Richmond Hill and 64 in Oakville, Ontario.

The chlorin test is advocated because it is very simple and definite, but its value depends upon the exact determination of the normal chlorin content of ground waters. The results reported by the author show that this normal is very difficult to determine with the present careless method of constructing wells. He therefore believes that there should be some legal requirement providing that new wells shall be so constructed as to protect them from surface drainage.

Conference of municipal and private owned water plants of Indiana with the State board of health, 1908 (*Indianapolis, Ind.: State Board of Health, 1908, pp. 111*).—This is an account of a conference held at Indianapolis July 8 and 9, 1908, to consider the source of water supplies in Indiana, their preservation and purification, and to establish standard and uniform methods of analysis. Among the more important papers presented were: History of Indiana's Water Supply, by J. N. Hurty; Underground Water Supply of Indiana, by F. G. Clapp; Transmission of Typhoid Fever, by H. E. Jordan; and The Present Condition of the Water Supply of Indiana, by H. E. Barnard. Smaller articles relating to water pollution and its prevention and methods of examining waters are included.

Purification of water by freezing, F. T. Shutt (*Canada Expt. Farms Rpts. 1907, pp. 176, 177*).—Analyses are reported which show the elimination of a large amount of organic matter from highly colored river water on freezing. It was also observed that a large proportion of the saline matter in lake water was removed by freezing, a sample of the water before freezing containing 1,525 parts per million of total solids yielding an ice containing only 90 parts per million of solids.

The disinfection of sewage and sewage filter effluents, E. B. Phelps (*U. S. Geol. Survey, Water-Supply Paper No. 229, pp. 91, pl. 1*).—The results of investigations on disinfection of sewage at Boston, Mass., Red Bank, N. J., and Baltimore, Md., are reported. An account is also given of investigations at the sanitary research laboratory and sewage experiment station of the Massachusetts Institute of Technology on the putrescibility and stability of sewage effluents.

It is pointed out "that purification of sewage has come to mean primarily the removal of its tendency to putrefy and not the total oxidation and removal of all its organic matter," and that "chemical disinfection offers a means whereby a reasonable bacterial purification may be accomplished without complete purification of the organic matter."

On a cost basis, chlorin in some form is considered the most efficient agent for chemical disinfection. "The application of 3 parts per million of available chlorin in the form of bleaching powder to a trickling-filter effluent similar to those on which experiments were made effects satisfactory disinfection. . . . The cost of disinfection ranges from $1 to $1.50 per million gallons of sewage, depending chiefly on the size of the plant. Effluents of higher degrees of purity can be disinfected at still lower cost. Five parts per million probably represents the maximum amount of chlorin required for the treatment of trickling-filter effluents of poorer quality."

The removal of over 98 per cent of the total bacteria of crude sewage requires "the application of from 5 to 10 parts per million of available chlorin, the amount depending on the character of the sewage. Such disinfection costs from $1.50 to $3.50 per million gallons."

In the investigations on putrescibility and stability of sewage effluents the aim was to establish a definite and stable standard of comparison based upon "the amount of oxygen which the effluent will eventually require before it will have become perfectly stable. The amount of this available oxygen is estimated fairly well by the chemical determination of dissolved oxygen and nitrates."

It is believed that "in general, effluents having a relative stability greater than 90 per cent may be discharged into any stream without danger of their consuming any of the oxygen of the water, because effluents of such high stability will retain oxygen indefinitely on exposure to the air."

SOILS—FERTILIZERS.

Handbook of moor culture, W. Bersch (*Handbuch der Moorkultur. Vienna and Leipsic, 1909, pp. XII+288, pls. 8, figs. 41*).—This book supplements earlier treatises on the subject and embodies the results of the recent rapid progress in moor culture. It treats of the origin and formation of moors, classes of moors, chemistry and physiology of moor soils, cultivation of moors, moor agriculture, moor forestry, meadows and pastures on moors, suppression of weeds, moor cover, and cost and economy of moor culture.

Soil surveys as related to geology, H. B. Kümmel (*Ann. Rpt. N. J. Bd. Agr., 36 (1908), pp. 162–169*).—The importance of soil surveys as an aid to the better utilization of soils is emphasized, and it is stated that such a survey is about to be undertaken jointly by the New Jersey State Station and the State geological survey.

This survey "will include a chemical examination to determine the chemical composition of the soils and subsoils and the amounts of plant food present; a mechanical examination to determine the mechanical condition of the soil, its fineness or coarseness; its porosity or imperviousness, etc. It will also include an agricultural examination to determine the nature and quantity of crops now produced, and all will be based upon the topographic and geological investigations of the past 40 years."

Analyses of soils of Formosa, Argentina, J. J. Bolla and F. Lavenir (*Crón. Agr. [Argentina], 2 (1908), No. 4, pp. 67–72*).—Mechanical and chemical analyses of 26 samples of soils from this district are reported.

An interesting soil problem, R. D. Watt (*Transvaal Agr. Jour., 7 (1909), No. 27, pp. 428, 429*).—Analyses are given of samples of a soil which is thought to have been rendered unproductive by the presence of ferrous salts.

Acid soils, A. W. Blair (*Florida Sta. Rpt. 1908, pp. XXXV–XXXIX*).—Examinations of soils with reference to depth, acidity, and nitrogen content made since the issue of Bulletin 93 of the station (E. S. R., 20, p. 116) are here reported.

These soils included samples from the high pine, spruce pine, and flat woods regions and from palmetto hammocks. Of the 103 samples of soils and subsoils examined, 89 were tested for acidity by Veitch's limewater method and in 60 nitrogen were determined. Eighty-seven per cent of the cultivated soils, 61 per cent of the cultivated subsoils, 40 per cent of the deeper subsoils, and none of the virgin soils were found to be acid. The nitrogen content of soils bearing citrus fruits was found to be very low.

An examination of the brownish colored water collected in low places where large quantities of saw palmettos were scattered over the surface of the ground, showed that while the water was distinctly acid, there was only the faintest indication of tannic acid. This indicates that there is no foundation for the common belief that the acid condition of Florida soils is due to tannic acid leached from the saw palmetto.

Report on fertilizer experiments on swamp soils, R. HARCOURT (*Ann. Rpt. Ontario Agr. and Expt. Union, 30 (1908), pp. 37–39*).—This is a brief summary of information which has been collected for a number of years on the composition and productiveness of Ontario swamp soils.

It has been observed "that where the swamp material lies over clay, and particularly if it is not so deep but that some of the clayey materials may become mixed with the top soil, good results are obtained. But when the materials are not sufficiently decomposed to form a soil that will hold water when the land is tile-drained, or when the subsoil is a sand, the results are invariably poor."

Out of 44 samples of swamp soils analyzed only 3 were found to contain less than 1 per cent of lime and none was noticeably sour or acid. "Eight of the samples contained less than 0.3 per cent of potash and only 6 had less than 0.2 per cent of phosphoric acid. In nearly every case the lowest percentage amounts of these plant food constituents were found in swamp soils lying over sandy subsoils. The quantities of potash and phosphoric acid found in these soils are not large; but the average results show fully as much as will be found in most of our good arable soils, and some of them contain an unusually large amount. They also contain from four or five to ten times as much nitrogen as our ordinary soils. Consequently, it is evident that the unproductiveness of these soils can not always be charged to the lack of plant food.

"The results of determinations of humus show that decomposition has proceeded further in some cases than in others, and, as the nitrogen and possibly the greater part of the mineral constituents are held in organic combination, it is quite probable that in many instances decomposition does not take place rapidly enough to furnish a full supply of food to the plant."

In fertilizer experiments with oats on the swamp soils the use of potash as a rule increased the yield, especially in cases in which lime was not used. Lime and phosphoric acid had little effect.

Swamp soils, R. HARCOURT (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 66–68*).—This has been noted from another source (see above).

On the process of separation of soluble mineral products from plant residues, S. KRAVKOV (*Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 9 (1908), No. 5, pp. 569–626; abs. in Chem. Zentbl., 1909, I, No. 6, pp. 458, 459*).—This is an account of a series of systematic studies of the mineral constituents dissolved by water from plant residues such as leaves, straw, hay, and roots before and after decomposition.

The processes of interaction between the products of the decomposition of organic remains and the constituents of the soil, S. KRAVKOV (*Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 10 (1909), No. 1, pp. 1–34*).—In continuation of the investigations noted above, an attempt was made to determine the changes in the chemical composition which soil undergoes under the influence of the soluble products of the decomposition of plant residues.

From the results of experiments on a rather light sandy chernozem and on a gray forest soil the author concludes that where the conditions are such that the soluble constituents are rapidly removed from the soil there is a progressive

decline of both humus compounds and mineral constituents, the reverse being true where the conditions favor accumulation of the soluble constituents. The lime and magnesia of the plant residues, as well as of the soil, play the leading rôle in these changes. The degradation of the chernozem soil as well as the "regradation" of the gray forest soil into chernozem can be brought about artificially.

[Organic matter as a means of preventing loss of soluble plant food by leaching], A. W. BLAIR (*Florida Sta. Rpt. 1908, pp. XXXIX–XLI*).—In experiments in which a rather coarse sandy soil without admixture and with varying amounts (1 to 10 per cent) of muck was subjected to leaching, it was found that the addition of the organic matter reduced the loss of plant food through leaching and improved the capillary power of the soil.

The relations between permeability of soils and their adaptability to irrigation, A. MÜNTZ and L. FAURE (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 22, pp. 1435–1440; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 24, p. 763*).—It is shown that the permeability of the soil is an essential factor in connection with the use of irrigation water. The permeability may in certain cases be so great as to render irrigation unprofitable or greatly reduce the benefits that may be derived from it.

It is recommended that the determination of the permeability of the soils should precede the establishment of every irrigation project and that in case of a limited supply of water its application be limited to the soils of medium permeability. The distributing system could in this case be more economically installed and the efficiency of irrigation would be increased.

Moisture determinations, A. W. BLAIR (*Florida Sta. Rpt. 1908, pp. XLI–XLIV*).—Determinations of moisture during April and May in samples of various soils taken in 1 ft. sections to a depth of 4 ft. are reported.

Contribution to methods of bacteriological soil investigation, VOGEL and ZELLER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 1 (1908), No. 2, pp. 167; abs. in Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 14–17, pp. 418–420*).—The authors' experience with various chemical-biological methods of soil examination with reference especially to the increase of the nitrogen supply of soils by bacterial activity is given.

Investigations on Azotobacter chroococcum, S. KRZEMIENIEWSKI (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 6–9, pp. 161–173*).—Studies are reported which show that mixed cultures of *Azotobacter chroococcum* are more active in fixing nitrogen than pure cultures. Both Azotobacter and Granulobacter fix free nitrogen, but in a medium free from humus the latter is much more active than the former. In neither case does Radiobacter alone fix nitrogen, although it aids fixation by other organisms. In the decomposition products of carbohydrates (humate) in cultures of Azotobacter the author, contrary to the observation of Stoklasa, found neither alcohol nor organic acid in determinable amounts.

Experiments on the inoculation of legumes with nodule bacteria, GERLACH and VOGEL (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 1 (1908), No. 2, pp. 123; abs. in Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 14–17, pp. 416–418*).—The results of pot experiments with soils from different parts of the provinces of Posen and West Prussia to determine the extent of distribution of active root tubercle organisms show that in many cases inoculation is needed, particularly on new or peaty soils and where new leguminous crops are introduced. If inoculating material were cheaper general use of it would be advisable.

A new theory of soil fertility, A. EINECKE (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 21, pp. 340, 341*).—This is a review of the theory advanced by the

Bureau of Soils of this Department in Farmers' Bulletin 257 (E. S. R., 18, p. 119).

Is the value of manure affected by the use of disinfecting materials? SOBOTTA (*Deut. Landw. Presse, 35 (1908), No. 78, pp. 820, 821; abs. in Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 6–9, pp. 262, 263*).—The author is of the opinion that the coal-tar preparations in particular injuriously affect the value of manure and in some cases act as plant poisons. In general he cautions against the continued use of poisonous materials which may accumulate in the soil to the detriment of growing plants.

Green manures, R. GAGEY (*Bul. Dir. Agr. Com. et Colon. [Tunis], 12 (1908), No. 49, pp. 479–515, pls. 2, fig. 1*).—The advantages of green manuring, plants adapted to the purpose, and their methods of culture, especially as applied to Tunisian conditions, are fully discussed in this article.

Contribution to the study of Sardinian guanos with special reference to the determination of the ammoniacal nitrogen, R. BINAGHI (*Staz. Sper. Agr. Ital., 42 (1909), No. 3, pp. 195–230, fig. 1*).—After a discussion of the location and source of various guano deposits and of analyses of samples of guano from different parts of the world, the author gives the results of his own investigations of Sardinian guanos. For determination of nitrogen the Schloesing-Aubin method was used with a modified apparatus, which is described and illustrated. The following conclusions are drawn:

(1) The view of other analysts that bat guano is less rich in fertilizing constituents than that of sea birds is confirmed; (2) the Sardinian guanos are to be classed as ammoniacal; (3) they possess every quality requisite for fertilizing the soil and are not inferior to American and African guanos; (4) with the modification of the Schloesing-Aubin apparatus more exact and quicker results are obtained than with the original method.

The guano birds of Peru, R. E. COKER (*Science, n. ser., 29 (1909), No. 751, p. 838*).—The chief guano-producing birds are described as well as the conditions which promote or hinder their multiplication. A system of rotation whereby birds are to be allowed to remain undisturbed for a period of years on certain islands, thus greatly increasing the accumulation of guano, is proposed.

Sulphate of ammonia in Germany in 1908 (*Chem. Ztschr., 8 (1909), No. 11, pp. 121, 122*).—Statistics of production and consumption in Germany and other countries are reviewed.

Nitrogen from the air (*Jour. Roy. Soc. Arts, 57 (1909), No. 2951, p. 621*).—Brief reference is made to a paper presented at the London meeting of the International Congress of Applied Chemistry by Bernthsen, in which attention is called to the Schönherr and Hessberger process of producing an electric arc flame of new form and higher efficiency in the oxidation of the nitrogen of the air. In this process magnets and magnetic fields are entirely dispensed with and the arc is produced inside an iron tube of comparatively small diameter, through which the air is made to pass and thus brought into intimate contact with the arc. It is stated that two new companies have been formed to exploit the process in Norway.

The manufacture of cyanamid, DE SEYNES (*Rev. Gén. Agron., n. ser., 4 (1909), No. 5, pp. 196–198*).—A very brief description is given of the process, with a list of European factories and organizations manufacturing and handling the product.

The new nitrogenous fertilizers utilizing atmospheric nitrogen, R. GUILLIN (*Bul. Soc. Agr. France, 1909, June 1, pp. 915–921*).—This is a report presented

to the International Congress of Applied Chemistry at London and deals with the results of practical experiments to test the fertilizing value of basic lime nitrate, calcium cyanamid, and dicyandiamid.

The actual status of the new nitrogenous fertilizers, G. L. RAGONDET (*Jour. Soc. Cent. Agr. Belg., 56 (1909), No. 7, pp. 204–213, figs. 2*).—This is a report upon the present status of the manufacture and agricultural utilization of basic lime nitrate and lime nitrogen. The results of field experiments with these fertilizers on a variety of crops are reported.

Fertilizer experiments with phosphates, H. KLEBAHN (*Jahrb. Hamburg. Wiss. Anst., 25 (1907), Beiheft 3, pp. 279–291, pls. 2*).—Comparative pot and field tests of Thomas slag, superphosphate, and agricultural phosphate (fine ground raw phosphate) with kainit and nitrate of soda on barley, oats, and beans grown in sandy and peaty soil are reported. While the results were not altogether conclusive they show that the agricultural phosphate and Thomas slag were nearly equally effective on moor soils, but less effective on sandy soils.

The solution of phosphoric acid in water-insoluble compounds under the action of bacteria and yeasts, E. KRÖBER (*Jour. Landw., 57 (1909) No. 1, pp. 5–80*).—Previous investigations on this subject, particularly those of Stoklasa, are reviewed, and a series of studies to verify the conclusions from these investigations and to study the influence of various conditions upon the activity of bacteria and yeasts in rendering phosphates soluble is reported.

The investigations show in general that the activity of acid-forming bacteria and yeasts is of great importance in rendering phosphoric acid soluble in the soil. Of first importance in this respect is carbon dioxid, but other acids, such as acetic acid, butyric acid, and lactic acid produced by bacteria also exert a considerable influence. The presence of basic substances which readily combine with these acids interfere with solution as long as the bases are in excess in the soil.

The amount of active lime and calcium carbonate in the soil, as well as the form of nitrogenous fertilizers used, plays an important rôle in the action of the phosphatic fertilizers. In compost experiments it is of importance from the standpoint of solubility of the phosphate whether the mixture gives an acid or alkaline reaction, since in the latter case the neutralization of the acids would prevent solution of the phosphoric acid.

The author concludes from his experiments that the life activities of the bacteria, that is, assimilation of phosphoric acid by the living organism, play little or no direct part in solution of the phosphates, but that the latter is due to the action of the organic acids and of the carbon dioxid produced.

The action of yeasts in rendering phosphoric acid soluble increased with the increase of neutral phosphate added to the nutrient solution, of carbon dioxid produced, of the sugar content up to an optimum, and in general, with the improvement of conditions which increased the production of carbon dioxid.

The acids produced by bacteria acted upon all kinds of phosphates, reducing them to the soluble monophosphate, but the rate of solution varied widely with the different phosphates. Tricalcium phosphate in precipitated form, dicalcium phosphate, and tetracalcium phosphate of Thomas slag were much more rapidly dissolved than the crystalline phosphates or the so-called amorphous phosphates.

The better action of difficultly soluble phosphates in humus soils is attributed not only to the fact that such soils are rich in humus acids, but that there is an active respiration and fermentation of acid-forming bacteria, molds, and yeasts in such soils.

Basic phosphatic slag, J. B. LINDSEY (*Amer. Fert., 30 (1909), No. 5, pp. 5, 6*).—This is a brief summary of information regarding the composition, availability, fertilizing value, and use of phosphatic slag.

Production of phosphate rock during 1908 (*Oil, Paint and Drug Reporter, 75 (1909), No. 25, pp. 28D, 28E*).—According to an advance report issued by the U. S. Geological Survey and reprinted here, the total production of phosphate rock in the United States in 1908 was 2,386,138 long tons valued at $11,399,124, representing a slight increase over the production of the previous year. The estimated life of the present known deposits and the importance and means of preventing their wasteful use are discussed.

A new potash salt (*Engin. and Min. Jour., 87 (1909), No. 25, p. 1239*).—A new potash salt consisting of ferrous chlorid, 1 part; potassium chlorid, 3 parts; and sodium chlorid, 1 part, obtained from the mines of the Nordhäuser Potash Works, is described.

The action of soda on plant growth, H. VAGELER (*Fühling's Landw. Ztg., 58 (1909), No. 10, pp. 369–373*).—The general conclusion drawn from pot experiments reported in this article is that soda is either completely worthless as a plant food or is injurious to plant growth. It was found to be without effect upon the physical properties of loam soils except when used in large amounts. In this case it tended to make the soil more compact.

Lime and magnesia in plants and soils, O. LOEW (*Fühling's Landw. Ztg., 58 (1909), No. 10, pp. 355–369*).—This is a new presentation of the author's well-known views regarding the influence of the relative proportion of lime and magnesia in the soil upon the growth of plants.

Locusts as a fertilizer (*An. Soc. Rural Argentina, 43 (1909), No. 52, pp. 145, 146*).—It is shown that locusts have a high fertilizing value, being especially rich in nitrogen, and it is suggested that the large swarms which occasionally appear in parts of Argentina might be profitably used for this purpose.

On the utilization of pond mud as a soil improver, H. GRUNER (*Deut. Landw. Presse, 36 (1909), No. 38, pp. 411, 412*).—In view of the fact that this material contains very small amounts of fertilizing matter and frequently contains injurious substances, weed seeds and the like, it is considered doubtful whether its use as a fertilizer is advisable. Analyses of a few samples are given.

Commercial fertilizers, J. S. BURD (*California Sta. Bul. 202, pp. 295–325*).—This bulletin contains tabulated analyses of 271 samples of fertilizers examined during the six months ended December 31, 1908. The bulletin also contains notes on the valuation and purchase of fertilizers.

Fertilizers, G. ROBERTS (*Kentucky Sta. Bul. 140, pp. 39–87*).—This is a compilation of information on the purchase and use of fertilizers, sources of fertilizing materials, care of farm manures, and green manure crops. The importance of disseminating correct information regarding the purchase and use of fertilizers is indicated by the statement that "there are expended annually for commercial fertilizers in Kentucky about one and one-quarter millions of dollars," but that "a very large part of this money is lost because many farmers do not know how to purchase fertilizers economically and use them to best advantage."

Fertilizing materials, F. T. SHUTT (*Canada Expt. Farms Rpts. 1907, pp. 159–165*).—Analyses of fish scrap from dogfish reduction works, whale scrap, refuse from wine factory, waste from cotton factory, flue deposit and dust from elevators, gypsum, river deposit, limekiln ashes, marl, calcareous deposit, and gas lime are reported, with comments upon their fertilizing value.

AGRICULTURAL BOTANY.

Report on metabolism in Arum spadices and the electrical response of vegetable tissues, A. D. WALLER (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 463–478, figs. 16*).—An account is given of work done by Miss Sanders on the metabolism of Arum spadices and by Miss Kemp on the occurrence in certain vegetable tissues of a propagated electrical response to stimulation.

In the first investigation, which was conducted to determine the changes going on in Arum spadices during inflorescence, but little advance was made, owing to the difficulty of securing flowering material. It was possible, however, to extend observations on the enzym activity of the plants and on the nuclear changes taking place.

It was found that the active spadices of *A. italicum*, *A. crinoides*, *A. crinitum*, and *Dracunculus vulgaris* secrete a proteolytic enzym or enzyms comparable with trypsin in attacking proteids and peptones, but carrying the process of splitting to a further stage in which tryptophane can no longer be detected. Experiments are still in progress relating to the splitting up of sugars by plant enzyms, and from the fact that the author was not able to ascertain which sugars resulted by the ordinary methods, it is suggested that possibly there is a further stage in carbohydrate metabolism parallel to the complete breaking down of proteids.

In the experiments on electrical response, observations were made on seedling plants of the mustard, pea, and bean, and upon the adult petioles of the maidenhair fern. With the exception of a few cases where the nature of the stimulus was mechanical, the thermo-electric method of stimulation was used.

The data presented are insufficient to determine the true nature of the change by transmission of which an electrical disturbance is set up at points distant from that of the exciting stimulus. It appears that the transmission is essentially a physiological process, as shown in the character and extent to which the propagation varies in accordance with the general character of the tissue tested, and by the fact that a very slight etiolation or unhealthiness of a plant destroys its power of propagating a stimulus, as seen with seedlings grown in the laboratory under improper conditions of nourishment and light. It is further shown that the tissues quickly become fatigued unless in optimum condition and that on altering the state of the tissue in such a way as to annul its power of response while at the same time increasing its electrical conductivity, no propagation of an excitatory stage can be obtained.

The investigations lead to the conclusion that the power of propagating excitation, instead of being a rare and specialized phenomenon in vegetable tissues dependent upon special fibrillar structures, as claimed by Bose, is innate in every normal cell and occurs freely wherever the protoplasmic continuity between cell and cell is at all considerable.

Mechanical and electrical response of plants, J. C. BOSE (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 903, 904*).—The author briefly describes a method by which he has been able to make accurate studies of the effect of external stimulus on plants. He claims to have shown that all organs of all plants are sensitive to excitation. Further he claims that the fibrovascular elements provide preferential channels through which waves of excitation are conducted.

The influence of electricity on plant growth, M. BRESLAUER (*Electrochem. Ztschr., 16 (1909), Nos. 1, pp. 1–5; 2, pp. 35–39, figs. 4; 3, pp. 72–75, figs. 3*).—A description is given of investigations of various individuals relating to the application of electricity as a stimulus of plant growth, particular attention being given to the experiments of Lemström (E. S. R., 16, p. 646), Sir Oliver Lodge (E. S. R., 20, p. 630), and others.

Movement in plants, F. DARWIN (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 3–27*).—This is the presidential address delivered before the British Association and describes the author's investigations and conclusions regarding the power of movement in plants.

The influence of pulling tension on the formation of mechanical tissue in the stems of plants, J. S. BORDNER (*Rpt. Mich. Acad. Sci., 10 (1908), p. 43*).—A brief account is given of experiments conducted to determine the effect of pulling tension along the longitudinal axes of plants. One hundred and thirty-five stems were subjected to tension and an anatomical study afterwards made of them. The tension was applied by means of weights suspended from cords running over light pulleys.

The results obtained with sunflowers, mustard, beans, castor beans, etc., showed an increase in the breaking strength of from 5 to 55 per cent. This was accompanied by an increase of xylem or of hard bast and in most species of both. In the case of the blackberry (*Rubus occidentalis*) there was an increase in the hard bast but a decrease of xylem in the experimental plants.

The influence of contact and tension upon the tendrils of Passiflora cœrulea, W. D. BRUSH (*Rpt. Mich. Acad. Sci., 10 (1908), p. 44*).—A brief sketch is given of experimental work carried on by the author during two years to determine the effect of contact and tension upon the strength of tendrils. The results show that contact had a marked effect in producing greater strength of the tendril, and important anatomical differences were found in tendrils due to contact and to tension.

Effect of swaying by the wind on the formation of mechanical tissue, MAUDE GILCHRIST (*Rpt. Mich. Acad. Sci., 10 (1908), p. 45*).—Experiments are reported with the common garden sunflower to show the effect of swaying motions on the development of mechanical tissue. These motions were obtained by means of special apparatus operated by an electric motor. It was found that the stems of plants swayed as by the wind are shorter and thicker than those not swayed, the diameter in the plane of swaying is greater than that at right angles, the xylem in the plane of swaying is increased in amount, the rigidity of the stems is increased, and the tensile strength appears to be decreased, although the work on this point is not considered conclusive.

The influence of living cells on the transpiration current, H. H. DIXON (*Rpt. Brit. Assoc. Adv. Sci., 1908, p. 901*).—A brief account is given of some investigations to determine the influence of living cells on the transpiration current. Two similar branches were selected, one of which was killed by being surrounded with steam, and the rates of transmission were observed in both branches. The similarity of action of both branches indicates that the influence of living cells on water transmission is insensible. Similar results were obtained when branches were killed with picric acid.

The fading of leaves due to want of water is held to be quite different from the fading of those supported by dead cells. In the latter case there appear indications of poison, and the poisonous effect of water which has passed through a killed branch may be observed by supplying water to the basal leaves. These experiments are held to lend no support to the vital theories of the ascent of sap.

On the increase in dry weight as a measure of assimilation, D. THODAY (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 905, 906*).—The author has carried on investigations on the method of determining the rate of assimilation from the dry weight of plants, since that method appears to be the only one available for determining the rate of assimilation in the open air. This method was first suggested by Sachs in 1883, and the author's investigations show that

Sachs' estimated rate of assimilation of leaves of sunflower, 16 mg. per square decimeter per hour, is substantially correct. The calculation of the equivalent intake of carbon dioxid from the increase of dry weight can only be considered at present as a rough approximation, since there is too little known of the composition of the various products of assimilation.

The carbohydrates of the snowdrop leaf and their bearing on the first sugar of photosynthesis, J. PARKIN (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 907, 908*).—The author carried on experiments with the snowdrop (*Galanthus nivalis*) to extend knowledge regarding the sugars which appear as a direct effect of photosynthesis. This plant was selected, as under ordinary conditions no starch is formed in its mesophyll and the problem is not complicated by the presence of maltose. If sucrose is present it is held that it could not have originated from maltose.

The author found, as a result of about 40 duplicate analyses, that the quantity of sugar in the leaf is considerable, and that the amount in a single leaf increases from above downward. At the same time the ratio of sucrose to glucose and fructose diminishes. The proportion of sucrose to the hexoses (glucose and fructose) decreases as the season advances. The percentage of hexoses remains fairly constant while that of the sucrose fluctuates greatly, increasing during the day and diminishing at night. Leaves darkened for some days still contain a moderate quantity of sugar, and when reilluminated they show a large increase of sucrose, while the amount of hexose undergoes little alteration.

The author believes that in photosynthesis the formation of sucrose precedes that of the hexoses rather than that the converse takes place.

The factors influencing photosynthesis in water plants, A. M. SMITH (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 906, 907*).—By means of an apparatus which maintains a current of water containing dissolved carbon dioxid passing at a constant rate over a plant inclosed in a chamber, the author was able to study the conditions of assimilation, such as carbon dioxid supply, temperature, and light. These are held to be the actual limiting factors under the different conditions of the experiments, and it is shown that when carbon dioxid is the limiting factor, plants with an internal atmosphere (flowering plants) have an advantage over those without it in being able to convert a higher proportion of the carbon dioxid. No depressing effect of carbon dioxid on assimilation could be detected up to a point when the supply was about one-third of saturation, corresponding to an atmosphere containing 33 per cent carbon dioxid, or from 30 to 50 times as much as occurs in ordinary tap water. Water plants were found extraordinarily sensitive to external conditions, a night in the laboratory considerably depressing assimilation, and a week's confinement under laboratory conditions reducing it to a very small amount.

Color changes in flowers produced by controlling insolation, H. E. RAWSON (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 902, 903*).—A brief account is given of experiments carried on in South Africa in which the color of nasturtiums was decidedly influenced by cutting off the rays of the sun by opaque screens at certain intervals during the day. The experiments with dahlias and cosmos indicate that their coloration can be changed as readily as that of nasturtiums.

Mutual interactions of plant roots, J. B. DANDENO (*Rpt. Mich. Acad. Sci., 10 (1908), pp. 32–36*).—Experiments are reported which were conducted to ascertain information regarding the material excreted by roots and the interactions of the roots of one plant upon another. The experiments were divided into two groups. For the first period the seedlings were grown until the radicles had attained a length of 15 to 20 mm. The second period included the growth up to about 4 weeks.

It was found that during the first 24 to 48 hours 2 seedling plants when grown together often promote the growth of each other, but afterwards bacteria and aquatic fungi prey upon the dead cells of the root cap, and upon the dying root hairs, producing substances decidedly injurious to the roots.

The injurious effects noted are attributed mainly to the excretion of fungi and bacteria in cultures. It was found that when a plant was watered with plant juice the first bacteria or fungi which attacked the plant juice produced harmful effects, and it was not until these harmful excretions were decomposed by other bacteria or by the chemical action set up by manure that the injurious causes were removed. The excretion of fungi was usually injurious to plant roots, excepting in the case of a symbiosis of mycorrhiza and host. Preliminary experiments indicate, however, that the excretion of mycorrhiza is injurious only to the roots of other than those of the host plant.

In conclusion the author says that the loose cells set free by roots are the prime cause of the injury, though not the direct cause. They furnish food for fungi and bacteria, but it is the excretion of these organisms that causes the injury.

[Studies on the adventitious embryos in the orange and mango], J. Belling (*Florida Sta. Rpt. 1908, pp. CIX–CXXV, pls. 5*).—Attention is called to the work of Strasburger and others showing the occurrence of adventitious embryos in the seed of the orange, and the results of the author's investigations with the mango are described at length.

A large number of seeds of a variety known as No. 11 were examined and comparisons made with other varieties. The occurrence of polyembryos seemed to be quite constant in some of the varieties, while an examination of the egg cells of fruits of the variety No. 11 from isolated trees showed that there was no embryo formed in the embryo sac, all the embryos being apparently adventitious. Attention is called to the fact that mango seeds may retain their vitality for a considerable time during the hot weather in Florida, and that stones taken from mango fruits immediately upon gathering, if cleaned from the pulp and planted in clean sand, usually give healthy germination. These results confirm those of Higgins as reported in Bulletin 12 of the Hawaii Station (E. S. R., 17, p. 1155).

Further contributions to the subject of graft hybrids, H. Winkler (*Ztschr. Bot., 1 (1909), No. 5, pp. 315–345, pl. 1, figs. 4*).—In continuation of previous reports on a graft hybrid between the cultivated tomato and the black nightshade, further notes are given on this form, which the author has called *Solanum tubingense*, and descriptions of additional graft hybrids are given. These new forms have been designated by the following names: *S. proteus*, *S. darwinianum*, *S. kœlreuterianum*, and *S. gærtnerianum*.

Trees, H. M. Ward (*Cambridge, 1909, vol. 5, pp. X+308, pl. 1, figs. 209*).—This volume treats of the form and habit of trees, with an appendix on seedlings, and is the concluding volume of the Handbook of Forest Botany for the Woodlands and the Laboratory. The previous volumes have already been noted (E. S. R., 20, p. 1133).

American medicinal barks, Alice Henkel (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 139, pp. 59, figs. 45*).—In this bulletin, which forms the second of a series on American medicinal plants (E. S. R., 19, p. 529), are given descriptions of the barks recognized as "official" in the eighth revision of the United States Pharmacopœia, together with a number of other "nonofficial" ones that are in considerable demand, if judged from the quotations and trade catalogues of dealers in drugs. The number of drug plants fully described is 35, but under many descriptions closely related species are also briefly treated.

The Uredineæ of Finland, J. I. Liro (formerly Lindroth) (*Bidr. Känn. Finlands Natur och Folk, 1908, No. 65, pp. 642, figs. 15*).—This is a contribution on the morphology, biology, wintering forms, injury, and method of investigation of rusts. After discussing these different factors, systematic descriptions are given of the species occurring in Finland, 246 having been so recognized. The synonymy of the different species is given in full, and an extensive bibliography concludes the work.

Culture experiments with some rust fungi, I, II, J. I. Liro (formerly Lindroth) (*Acta Soc. Fauna et Flora Fennica, 29 (1906–1908), Nos. 6, pp. 25; 7, pp. 58, figs. 6*).—Descriptions are given of culture experiments with a number of rust fungi, the object of the investigations being to determine the alternate generations, host plants, methods of wintering, specific relationships, affinities, etc.

The death rate of bacteria under the action of disinfectants, Harriette Chick (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 901, 902*).—The author claims that disinfection is a process closely analogous to chemical reaction, the disinfectant representing one reagent and the protoplasm of the bacterium the other. The process is found to proceed in accordance with the mass law, the number of surviving bacteria being substituted for the concentration of reacting substance. The number of living bacteria, when enumerated after successive intervals of time, is found to decrease in a logarithmic manner.

The experiments upon which these conclusions are based were made by the author and other workers with spore-bearing and vegetative types of a number of bacteria, employing metallic salts, phenol and other coal-tar derivatives, and heat as means of disinfection.

FIELD CROPS.

Field experiments with farm crops, W. Saunders, J. H. Grisdale, W. T. Macoun, F. T. Shutt, C. E. Saunders, R. Robertson, J. Murray, A. Mackay, W. H. Fairfield, G. H. Hutton, and T. A. Sharpe (*Canada Expt. Farms Rpts. 1908, pp. 5–9, 17–31, 33, 34, 38, 39, 80–90, 124–127, 131, 132, 135–152, 216–219, 223–240, 267–283, 291–305, 317–336, 357–366, 368–380, pls. 4*).—The results with field crops at the Canada Experimental Farms in 1907 are reported, in a manner similar to that in previous years (E. S. R., 19, p. 935).

A general review of the season is given and a brief report on culture tests with wheat, emmer, oats, barley, corn, turnips, and potatoes at Ft. Vermilion, 350 miles north of Edmonton, is presented. In brief descriptions of visits to the different farms, the work of each place is briefly summarized. The results of variety tests at the different farms are summarized in the following table:

Varieties leading in yield at the Canada Experimental Farms in 1907.

Crop.	Varieties tested.	Leading varieties.	Yield per acre 1907.		Date of ripening.	Growing period.
			Bushels.	Pounds.		
						Days.
Ottawa:						
Potatoes	30	Pinnacle Beauty	462	.....	.....	.....
Spring wheat	39	Chelsea	45	.....	Aug. 8	101
Durum wheat	12	Gharnovka	54	30	Aug. 13	102
Winter wheat	20	American Banner	62	30	July 27	332
Emmer and spelt	11	Smooth Spelt	.....	2,850	Aug. 28	110
Oats	54	Improved American	96	6	Aug. 13	103
6-rowed barley	24	Odessa	54	18	July 30	95
2-rowed barley	28	Hannchen	64	18	Aug. 4	99

Varieties leading in yield at the Canada Experimental Farms in 1907—Cont'd.

Crop.	Varieties tested.	Leading varieties.	Yield per acre 1907.		Date of ripening.	Growing period.
			Bushels.	Pounds.		
Ottawa—Continued.						*Days.*
Peas	22	Nelson	50	30	Aug. 16	100
Do	22	Paragon	50	30	Aug. 25	109
Spring rye	2	Ottawa Select	34	46	Aug. 5	94
Winter rye	3	Thousandfold	60	30	July 29	334
Beans	4	Norwegian Brown	60	.....	Aug. 26	93
Flax	7	Novarossick	16	34	Aug. 19	88
Nappan:						
Oats	31	Golden Giant	77	22	Sept. 16	118
6-rowed barley	15	Mensury	41	32	Aug. 31	101
2-rowed barley	13	French Chevalier	58	16	Sept. 6	107
Spring wheat	14	Red Fern	40	40	Sept. 14	117
Durum wheat	4	Roumanian	32	.....	Sept. 12	115
Emmer and spelt	4	Red Spelt	.....	2,040	Sept. 17	120
Buckwheat	5	Silverhull	45	40	Sept. 3	87
Potatoes	28	Rochester Rose	576	24	.....	.....
Millet	5	African Early	.....	1,480	.....	.....
Brandon:						
Spring wheat	15	Red Fife H	44	.....	Sept. 9	123
Durum wheat	4	Roumanian	45	40	Sept. 7	120
Emmer and spelt	4	Common Emmer	.....	2,820	Sept. 14	127
Oats	35	Danish Island	130	.....	Sept. 6	109
6-rowed barley	15	Oderbruck	81	12	Aug. 23	88
2-rowed barley	13	Standwell	79	8	Sept. 2	97
Peas	20	Gregory	48	20	Sept. 17	125
Corn	21	King Philip	.....	42,966	.....	.....
Potatoes	29	Collin Seedling	597	40	.....	.....
Millet	6	Hungarian	.....	10,312	.....	.....
Indian Head:						
Spring wheat	18	Marquis B	32	.....	Sept. 18	135
Durum wheat	5	Goose	31	40	Sept. 18	134
Emmer and spelt	5	Red Spelt	.....	2,200	Sept. 19	129
Oats	31	Sensation	127	32	Sept. 25	134
6-rowed barley	15	Blue Longhead	86	2	Sept. 26	105
2-rowed barley	13	Jarvis	61	2	Sept. 3	111
Peas	20	Chancellor	51	40	Sept. 14	117
Flax	5	Yellow Seed	17	8	Sept. 15	113
Potatoes	28	Ashleaf Kidney	486	12	.....	.....
Lacombe:						
Spring wheat	17	Percy A	34	.....	.....	.....
Durum wheat	4	Yellow Gharnovka	24	.....	.....	.....
Emmer and spelt	4	Common Emmer	.....	1,200	.....	.....
Oats	32	Pioneer	110	10	.....	.....
6-rowed barley	15	Nugent	72	24	.....	.....
Do	15	Mensury	72	24	.....	.....
2-rowed barley	13	Clifford	50	.....	.....	.....
Turnips	12	Hartley Bronze	.....	52,800	.....	.....
Mangels	10	Giant Yellow Intermediate.	.....	65,528	.....	.....
Carrots	6	Improved Short White	.....	52,744	.....	.....
Sugar beets	3	Wanzleben	.....	36,960	.....	.....
Potatoes	17	Early Envoy	220	34	.....	.....
Agassiz:						
Winter wheat	6	Red Velvet Chaff	36	40	July 24	277
Winter rye	5	Emerald	37	48	July 26	279
Oats	32	Danish Island	91	6	Aug. 10	113
6-rowed barley	15	Empire	55	.....	July 30	103
2-rowed barley	13	Standwell	57	24	Aug. 7	111
Peas	20	Chancellor	52	.....	Aug. 8	112
Potatoes	29	Morgan Seedling	598	24	.....	.....

At Ottawa in cooperative experiments with potatoes on small plats in the station tests, White Giant and Dibble Favorite each gave a total yield of 391 bu. and 36 lbs. per acre, and the Cottar in the same kind of an experiment and on still smaller plats ranked first with a yield per acre of 471 bu. and 54 lbs. Among 36 varieties of potatoes tested this year for resistance to blight the best yields were secured from Pearmain, The Factor, King Edward, Dalmeny Beauty, Dr. Maerker, and Rural Blush, mentioned in decreasing order of yields which ranged from 334 bu. and 24 lbs. to 184 bu. and 48 lbs. per acre.

On field plats from ½ to 1½ acres in area at the station Gold Coin ranked first with a yield of 200 bu. per acre, while Carman No. 1 variety ranked next, pro-

ducing 181 bu. Of the 10 varieties in this test Rochester Rose stood last with 60 bu.

Turnips, mangels, carrots, and sugar beets were each sown on May 23 and June 7. Of 13 varieties of turnips, Hartley Bronze ranked first in both early and late sowing, the yields being respectively 38 tons and 100 lbs. and 24 tons and 300 lbs. per acre. The average yield per acre from all varieties at the first sowing was 32 tons and 1,692 lbs., and at the second sowing 20 tons and 1,815 lbs. The first sowing of 10 varieties of mangels gave the average yield of 27 tons and 680 lbs., and the second sowing 19 tons and 180 lbs. Gate Post and Selected Yellow Globe ranked first and second in the early sown series of plats, with 31 tons and 1,100 lbs., and 30 tons and 600 lbs. respectively. In the later sown series of plats these two varieties also led, but Selected Yellow Globe produced 22 tons and 400 lbs. per acre, while Gate Post produced only 21 tons and 100 lbs. Among 6 varieties of carrots, Improved Short White gave the best yields for both early and late sowing, the yield per acre from the first sowing being 30 tons and 900 lbs., and from the second sowing 22 tons and 1,000 lbs. The first sowing of carrots gave an average yield of 24 tons and 1,517 lbs., and the second sowing 19 tons and 567 lbs. The first sowing of 3 varieties of sugar beets yielded on an average 21 tons and 1,300 lbs. per acre, and the second sowing 15 tons and 600 lbs. Vilmorin Improved ranked first in the early sown series with 23 tons and 1,200 lbs., and Wanzleben in the later sown series with 16 tons and 1,300 lbs. per acre.

Twenty varieties of ensilage corn were grown in rows and in hills. The average yield from the rows was 18 tons and 911 lbs. per acre, and from the hills 18 tons and 1,130 lbs. Eureka led in yield in the row grown series of plats with 27 tons and 120 lbs., and Giant Prolific Ensilage in the hill grown series with 25 tons and 1,150 lbs., Eureka standing second in this series with 23 tons and 1,410 lbs. Three varieties were sown in rows 21, 28, 35, and 42 in. apart. Selected Leaming and Champion White Pearl gave the best yields in rows 21 in. apart, while Longfellow produced best when planted in rows 42 in. apart. In this test Champion White Pearl ranked first in yield with 22 tons and 37 lbs. per acre.

At Nappan 15 acres of mixed grain, oats, barley, and peas gave an average yield of 31 bu. and 5 lbs. per acre. Of 21 varieties of ensilage corn grown in the rows the leading varieties, Giant Prolific Ensilage, Eureka, and Early Longfellow all yielded over 13 tons, and Eureka also stood first in the hill grown series, with 14 tons and 700 lbs. In the distance experiments Selected Leaming gave the best yield in the test, 13 tons and 1,075 lbs. when grown in rows 21 in. apart. The second best yield was produced by this same variety in rows grown 35 in. apart.

Turnips, mangels, carrots, and sugar beets were sown June 1 and June 15. On the early sown plats Good Luck turnip stood first with a yield of 34 tons and 1,465 lbs., and also ranked first on the later sown series, with 26 tons and 140 lbs. The best yield among the early sown plats of mangels, 38 tons and 1,385 lbs. per acre, was produced by Giant Yellow Intermediate, and the best yield among the later sown plats, 28 tons and 100 lbs., was produced by Gate Post. In the test with carrots the first sowing was a failure. On the plats sown June 15, the yields of these varieties ranged from 14 tons and 50 lbs. to 17 tons and 815 lbs., Ontario Champion standing first, and White Belgian last. The best yield per acre for the early sown sugar beets, 15 tons and 195 lbs., was produced by the Wanzleben variety which also produced the best yield, 14 tons and 710 lbs., in the later sown series.

At Brandon the largest yield of ensilage corn sown at different distances apart, 23 tons and 200 lbs., was produced by Selected Leaming, grown with 30 in. between the rows. The next best yield, 22 tons and 1,540 lbs., was produced by this same variety with 24 in., the smallest distance between the rows. Turnips, mangels, carrots and sugar beets were sown May 22 and June 5. Among 12 varieties of turnips, Perfection Swede led with 34 tons and 904 lbs. per acre in the early sown series, and Mammoth Clyde with 27 tons and 1,176 lbs. in the later sown series. Prize Mammoth Long Red gave the best yield for both early and late sowings of mangels, the yield being 27 tons and 1,704 lbs. and 23 tons and 1,520 lbs. per acre, respectively. Of 6 varieties of carrots, Improved Short White stood first with 24 tons and 400 lbs. per acre for the early sown, and Ontario Champion stood first with 19 tons and 60 lbs. for the second sowing. The best yield for the first sowing of sugar beets was produced by Wanzleben and amounted to 18 tons and 1,224 lbs. per acre. The best yield for the late sowing was by Vilmorin Improved, 17 tons and 320 lbs. Wanzleben led in sugar content with 17.86 per cent of sugar in the juice while Vilmorin Improved ranked first in purity with a coefficient of 85.6.

At the Saskatchewan Experiment Farm, Indian Head, among field plats of spring wheat Huron grown on a field of 2½ acres led in yield per acre with 32 bu. and 37 lbs. Red Fife on a 25-acre field produced 18 bu. per acre. The average yield of wheat on land which had produced a crop of peas the preceding year was larger than that of the varieties grown on fallow. The average yield of the fallow land was 22 bu. and 57 lbs. per acre. The results of a 5-year comparison showed that Huron ranked first with a yield of 39 bu. and 24 lbs., and was the earliest of 5 varieties compared, requiring 130.2 days to mature it and being 12.2 days earlier than Red Fife. Of 8 varieties of oats grown in field plats, Thousand Dollar was the most productive, yielding 95 bu. per acre. The average yield for these sorts was 79 bu. and 16 lbs. Field plats of oats were compared for 5 years and these tests show that Banner ranked first in average yield per acre with 94 bu. and 18 lbs., and taking 119.2 days to mature. The earliest variety in this test, Tartar King, ripened only 2.4 days earlier. Four varieties of 6-rowed barley in field lots ranged in yield from 48 bu. and 6 lbs. to 59 bu. and 22 lbs., the leading variety being Mansfield, while 4 varieties of 2-rowed barley ranged from 36 bu. and 32 lbs. to 48 bu., the leading variety being Canadian Thorpe. The average yield of 8 varieties was 48 bu. and 36 lbs. per acre. In a 5-year comparison of these same varieties, Claude ranked first with an average yield of 59 bu. and 35 lbs., being followed by Odessa with 58 bu. and 4 lbs., Mansfield 56 bu. and 31 lbs., and Mensury 53 bu. and 21 lbs.

Of 21 varieties of ensilage corn grown in rows and in hills Angel of Midnight stood first in both cases, yielding 13 tons and 1,170 lbs. in rows, and 11 tons and 550 lbs. in hills. The best yield in the distance test of this station was secured with Longfellow which yielded 14 tons and 1,610 lbs. per acre in rows 21 in. apart. The next best yield, 14 tons and 866 lbs. per acre, was secured with Selected Leaming in rows 35 in. apart.

Turnips and mangels at Indian Head were sown on May 27 and June 3 and carrots and sugar beets on May 22 and June 3. Hartley Bronze turnip produced 31 tons and 832 pounds per acre, leading among the early sown plats, and Mammoth Clyde produced 23 tons and 1,520 lbs., the highest yield secured from late planting. Of 10 varieties of mangels sown early, Giant Yellow Intermediate ranked first with a yield of 19 tons and 412 lbs., and of the same varieties sown late Half Sugar White stood first with a yield of 19 tons and 1,204 lbs. The best yield for early sown carrots was 13 tons and 268 lbs., being produced by Improved Short White, while on the series of plats sown June 3,

the highest yield was produced by Ontario Champion, reaching 18 tons and 1,752 lbs. The highest yielding variety of sugar beets was Vilmorin Improved, which gave a yield of 13 tons and 400 lbs. from early sowing and 12 tons and 288 lbs. from late sowing.

At Agassiz the leading variety of ensilage corn of 19 varieties tested was Eureka, which produced 22 tons and 220 lbs. grown in rows and 21 tons and 900 lbs. grown in hills. In the distance experiments with corn at this station the corn was also grown in rows and in hills. The best yield in rows, 18 tons and 680 lbs., was produced by Champion White Pearl in rows 42 in. apart. Champion White Pearl also stood first in yield of 18 tons per acre when grown in hills at a distance of 42 in. between the rows. Turnips, mangels, carrots, and sugar beets were sown on two different plats about 2 weeks apart in the early part of May. The highest yield in the experiment with turnips on the early sown plats was produced by Jumbo, and amounted to 18 tons and 1,752 lbs. On the late sown plats Mammoth Clyde ranked first with 16 tons and 76 lbs. Half Sugar White produced 25 tons and 160 lbs., being the highest yield for the early sown mangels, and Giant Yellow Intermediate yielded 20 tons and 1,844 lbs., which was the highest yield for the late sown plats. Ontario Champion among 6 varieties of early sown carrots produced 39 tons and 1,936 lbs., and also ranked first among the late sown carrots with 38 tons and 32 lbs. Vilmorin Improved among 3 varieties of sugar beets ranked first in both early and late sowings.

In 1907 the best yields from the special fertilizer experiments with wheat now in progress for 20 years were secured on plats 1 and 2 treated with 15 tons per acre of barnyard manure. Plat 6, which ranked first in 1906, stood second this year. In average yield for the 20 years the barnyard manure plats also stood first. In the tests with barley, plat 2 stood first with 38 bu. and 16 lbs. per acre, and this plat also heads the list in average yield for the entire period. In the tests with oats plat 1 ranked first with 64 bu. and 4 lbs. in 1907, and plat 2 ranked first in average yield for the entire 19 years with 55 bu. and 25 lbs. Plat 1 produced the highest yield of ensilage corn, 12 tons and 1,110 lbs. per acre in 1907. This plat also ranks first in average yield for 16 years with 16 tons and 272 lbs. Plats 1 and 2 also gave the best results for the year as well as the best average results with turnips and mangels.

Notes on the progress and the results of other fertilizer tests as well as rotation experiments and vitality tests are given.

Experimental work in field husbandry, C. A. Zavitz (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 172–182, 184–230, figs. 13*).—Experimental work carried on by the college, and the weather conditions prevailing during the season are described, and statistics on crop production in the province, including average yields of the different crops for 25 and 26 years are presented. Earlier reports have been previously noted (E. S. R., 19, p. 1130).

In 2 experiments made to determine the relative production of the principal grain crops, 1 in progress for 6 and the other for 2 years, it was shown that in both instances emmer produced the largest yield, followed in the order mentioned by barley, oats, hulless barley, and Wild Goose spring wheat. In the 6-year experiment common emmer produced 2,756 lbs., Mandscheuri barley 2,715 lbs., Joanette oats 2,559 lbs., and Black Hulless barley 2,527 lbs. of grain per acre. In the 2-year experiment the yields were a little larger. In the first experiment, Wild Goose wheat and flax produced the stiffest straw, and in the second, Wild Goose wheat and Dakota Mammoth spring rye.

The difference in productiveness of varieties is shown in a table. The average yields of Joanette, Siberian, Egyptian, and Black Tartarian oats grown for 19 years was 87.7, 87.3, 75.6, and 71.8 bu. per acre, respectively. The average

yield per acre for 4 different varieties of barley also grown for 19 years are as follows: Mandscheuri 71.2, Oderbruck 64.6, Mensury 60, and New Zealand Chevalier 58.3. Four varieties of winter wheat grown for 13 years yielded as follows: Dawson Golden Chaff 55.4, Imperial Amber 51.2, Turkey Red 45.5, and Treadwell 44.8 bu. per acre. Three varieties of spring wheat grown for 19 years gave the following average yields per acre: Saxonka 31 bu., Red Fife 30.7, and Colorado 27.9. The average yields per acre for 16 years for 3 varieties of spring wheat were as follows: Wild Goose 38.4, Medeah 34.3, and Ontario 23.5 bu. Empire State, White Elephant, Rural New Yorker No. 2, and Stray Beauty potatoes were grown for 19 years, and produced on an average for this period 225.5, 203.6, 203.4, and 161.5 bu. per acre respectively.

A comparison of the leading selected strains with the original variety of different varieties and classes of farm crops is reported. In nearly all cases the selected strains gave comparatively higher yields per acre than the standard varieties. Striking examples were Early Ripe oats, the standard yielding 67.7 bu., and the selected strain 81.6 bu. per acre; Dawson Golden Chaff winter wheat, the standard yielding 49.1 bu., and the selected strain 59.5 bu. per acre, and Siberian millet, the standard yielding 40.2 bu., and the selected strain 46.9 bu. per acre. The crops in these tests have been grown for 2 or 3 years. The average results with different sizes of seed show that in every instance the largest seed produced the largest yield of grain. In continuous selection experiments with seed oats, it was shown that there was an average annual difference in favor of the heavy plump seed of 10.4 bu. the first 4 years, 15.8 bu. the second 4 years, and 22.4 bu. the last 4 years, including 1903–1906.

Sprouting of winter wheat in the field before harvesting was found to injure the grain a great deal for seed purposes. The average results have shown that seed with the skin unbroken had a percentage of germination of 94, seed with the skin broken of 76, while considerably sprouted seed had a percentage of germination of only 30, and badly sprouted seed of only 18. The results of 12 separate tests show an average increase in the yield of winter wheat per acre of 7.8 bu. from the plump as compared with shrunken seed, and of 35.6 bu. from sound as compared with broken seed. In experiments with spring grains, shrunken and broken seed show a similar influence.

A comparison of varieties of oats to determine their susceptibility to attacks of smut shows that Early Ripe is probably entirely immune to attacks of this disease. The average results for 4 years show the highest average yield of flaxseed per acre was produced from 2 bu. of seed per acre.

From mixtures of oats and barley the best average yield for 2 years was produced by sowing 34 lbs. of oats and 48 lbs. of barley per acre. The best combination of varieties was Mandscheuri barley with a very early variety of oats, such as Alaska or Daubeney. Mandscheuri barley always gave the highest percentage in the crop produced. An experiment in growing for 2 years in succession 8 kinds of grain further demonstrates that Mandscheuri barley is a very heavy yielder, whether sown in combination with other grains or sown by itself. All experiments made along this line point out that a combination of barley and oats is the most productive mixture. While it was found that there may be a decided advantage in growing different classes of cereals together, growing different varieties of the same class in combination proved to be of no marked benefit.

Among 6-rowed varieties of barley Mandscheuri gave the best yields. Among the 2-rowed barleys, Hanna was one of the most satisfactory, and among the hulless varieties Guy Mayle ranked first. The average results for 12 years with winter barley were as follows: Weight per measured bushel 47.1 lbs, yield of straw per acre 1.2 tons, and yield of grain per acre 54 bu. During the

last 2 years Tennessee winter barley has given decidedly the largest yield of grain per acre as compared with other varieties.

The varieties of oats producing an average yield of more than 90 bu. per acre based on the results for 5 years are Banner, New Zealand, Yellow Russian, and Peerless. Scarboro produced the largest yield of straw, being 3.27 tons per acre for this period. In experiments conducted on 115 farms throughout the Province in 1908, Yellow Russian gave an average yield of 46.4, Irish Victor 45, and Daubeney 43.1 bu. per acre. Yellow Russian produced the largest amount of straw, and was the most popular of the varieties. A comparison of the strength of straw of a few varieties shows that Liberty possesses the strongest straw of the varieties in the tests. American Banner also made a good showing. Tartar King was found to lodge badly on low land.

A table is given showing the average weight per measured bushel for 12 years, the yield of grain per acre for 1908, and the average yield of both straw and grain per acre for 13 years of 15 varieties of winter wheat grown for flour production. The average results for the 15 varieties are as follows: Weight per measured bushel 62.8 lbs. for 1908, and 61 lbs. for the 13-year period, and the yield of grain per acre 31.9 bu. for 1908, and 47.7 bu. for the 13-year period. Dawson Golden Chaff stood first in average yield for the 13 years with 55.4 bu. per acre. Among 21 varieties of spring wheat Minnesota No. 163 ranked first in average yield for 5 years, Hungarian stood second in average yield, but ranked first in weight per measured bushel, weighing 62.1 lbs. or 3.2 lbs. more than Minnesota No. 163. Among 7 varieties of durum wheat grown for 5 years in succession, White Goose ranked first with 36.7 bu. per acre, followed by Kubanka with 36.3 bu. As a grain for feeding purposes emmer proved much more satisfactory than spelt. Three varieties of emmer showed an average variation of 261 lbs. per acre, and 4 varieties of spelt 402 lbs. Common emmer, the leading variety, produced 3,145 lbs. per acre on an average for 7 years, while Red spelt, the leading variety of spelt, produced only 2,271 lbs. Polish wheat (*Triticum polonicum*) and Turgid wheat (*Triticum turgidum*) were found much inferior in production to varieties of winter, spring, and durum wheats.

In a series of experiments with different crops the following varieties gave the largest average yields: Mammoth White winter rye grown for 5 years 63.3 bu., Saatroggen, classified as spring rye, grown for 5 years 30 bu., Rye Buckwheat grown for 4 years 32.7 bu., Early Britain field peas grown 9 years 38.3 bu., Pierce Improved Tree field bean grown for 10 years 24 bu., Medium Green soy beans grown for 4 years 1,031 lbs., Manitoba flax grown 4 years 18.9 bu., Siberian millet grown 4 years 55.2 bu., corn grown in 1908, Farmers' Surprise 70.1 bu., Mammoth Russian sunflower grown for 10 years 76.1 bu., Early Japanese sorghum average for 6 years 29.1 bu., Holborn Abundance potato in 1908, 272.5 bu., Yellow Leviathan and Criewen mangles grown for 5 years 32.6 tons, Giant White Feeding sugar beet average for 5 years 30.2 tons, Steel Improved Short White field carrot grown for 5 years 30.5 tons, Early White Vienna kohl-rabi grown for 7 years 19.5 tons, New Ideal Hollow Crown parsnips average result for 5 years 10.6 tons, Pennsylvania Early Dent corn average for 5 years experiments 27.58 tons, Black Giant sunflower grown for 13 years 6 tons of heads, Japanese Panicle millet, average for 5 years 4.6 tons of hay, and Sutton Earliest Drumhead cabbage grown for 5 years 27.8 tons per acre.

In the experiments with different kinds of sorghum it was found that the broom corn stood high in the yield of seed per acre, while the sugar canes occupied the highest place in yield of green crop. In 1908 Early Minnesota sugar cane gave the greatest yield per acre, and Orange furnished the largest

amount of green fodder in the average results for 5 years. The results of sowing millet on different dates show that the highest average yield of green crop was produced by Japanese Panicle and Japanese Barnyard when sown the first of June, and from Hungarian grass when sown about the middle of July. Of different leguminous crops grown for green fodder, Medium Green soy beans led in yield of freshly cut crop per acre, producing 8.1 tons. The average yield of alfalfa grown at the college for 11 years was 5.19 tons. In a test of alfalfa seed from different sources, seed obtained from the Panhandle in Texas led in yield with 11.9 tons of hay per acre. Directions for sowing alfalfa are given. A mixture of 51 lbs. of oats, 30 lbs. of Early amber sugar cane, and 7 lbs. of common red clover seed was found a very satisfactory annual pasture crop.

Field experiments, J. M. SCOTT (*Florida Sta. Rpt. 1908, pp. XXIX–XXXII*).—The use of dried blood, muriate of potash, and acid phosphate as fertilizers for the velvet bean apparently produced little or no influence upon the yield. It was further found that it is profitable to plant velvet beans in alternate rows with corn. The yield of shelled beans planted in this way amounted to 20.35 bu. per acre. The selection of white velvet beans is being continued and a yield of 18.54 bu. per acre of this strain was secured last season.

A total yield for the season of 16.59 tons of rape per acre is reported. This crop was grown on very light, sandy loam, and was fertilized September 25, 1907, with 300 lbs. of dried blood, 128 lbs. muriate of potash, and 350 lbs. of acid phosphate, and on February 10 with 150 lbs. of dried blood, 64 lbs. muriate of potash, and 175 lbs. of acid phosphate per acre.

In a fertilizing test with cotton the largest yield of seed cotton was secured where 360 lbs. of cotton-seed meal, 38.4 lbs. of muriate of potash, and 150 lbs. of acid phosphate per acre were applied. This plat was 0.4 acre in size and yielded 278 lbs. of seed cotton. A plat fertilized in the same manner with the exception that only 120 lbs. of cotton seed per acre was applied, produced 229 lbs. of seed cotton.

[Irrigation experiments], J. B. DAVIDSON (*Iowa State Col. Agr. Rpt. 1907–8, pp. 188–190*).—In tests made in cooperation with the Irrigation Investigations of this Office, a plat of irrigated corn yielded at the rate of 59.8 bu. per acre as compared with 57.8 bu. secured on a nonirrigated plat. This corn was irrigated August 20, 26, and September 7, approximately 2 in. of water being applied each time. The irrigated land also produced a larger percentage of good ears than the nonirrigated plat.

The yield per acre on an irrigated barley plat was 54 bu. and on a plat receiving no irrigation 41.4 bu. The bushel weight with irrigation was 45.3 lbs. and without it 44.5 lbs. Irrigation was given May 10 and June 15, and approximately 2 in. of water was applied each time.

Blue grass was irrigated April 24 and May 11, receiving a total of 4 in. of water. The irrigated plat yielded at the rate of 15,160 lbs. per acre and the nonirrigated plat at the rate of 10,360 lbs. The grass grown with irrigation contained 60.38 per cent of moisture, and that grown without it 67.26 per cent.

Report of work at the Delta Station for 1907–8, J. W. FOX (*Mississippi Sta. Bul. 119, pp. 12*).—This bulletin summarizes the work at the Delta Substation for 3 years, and describes the manner in which the different crops were grown.

Corn without fertilizers produced on an average 39 bu. per acre, 5 acres planted after corn and peas 47 bu. per acre, and 1 acre receiving 10 loads of stable manure and 300 lbs. of cotton-seed meal, 72 bu. An acre of oats planted after corn and peas produced 5,200 lbs. of hay. The average yield of alfalfa for the 3 years was 6,600 lbs. of hay per acre.

During the 3 years 231 acres of cotton were grown which produced for this period an average yield of 498.9 lbs. of lint per acre. In 1908 the results on a field of 13 acres showed that planting cotton level 3½ ft. each way was entirely too close when the crop made a large growth. The yield on this field was 492 lbs. of lint per acre. Eight standard varieties of cotton were compared to determine the relative yield of long and short staple varieties. The 1 in. staple produced 1,825 lbs. of seed cotton, and 645 lbs. of lint, the 1⅛ in. staple 1,780 lbs. of seed cotton and 570 lbs. of lint, the 1 3/16 in. staple 1,728 lbs. of seed cotton and 510 lbs. of lint, and the 1 7/16 in. staple 1,500 lbs. of seed cotton and 430 lbs. of lint per acre.

In a test of 14 varieties conducted in 1908, Cleveland Big Boll ranked first with 1,503 lbs. of seed cotton and 548 lbs. of lint per acre, and Lewis Prize second with 1,412 lbs. of seed cotton and 517 lbs. of lint. The average increase from 300 lbs. of cotton-seed meal per acre for the 3 years was 106 lbs. of lint cotton. Applications of phosphorus or potash failed to increase the yield.

Notes are given on sorghum, red clover, drainage, and trucking.

[Studies in the composition of field crops], F. T. Shutt (*Canada Expt. Farms Rpts. 1907, pp. 135–152*).—Chemical analyses of wheat, potatoes, mangels, turnips, and sugar beets are reported.

The work with wheat was conducted to determine the composition of the grain as influenced by environment. In the first experiment the wheat used as seed contained 11.11 per cent of protein, and the product from this seed when grown on recently cleared and broken land 9.93 per cent and when on summer fallow 12.62 per cent. The newly broken soil in a second experiment ranged from 9 to 14 per cent higher in soil moisture than the soil on the summer fallow. Both soils were rich in vegetable matter, and high in nitrogen. The wheat used as seed on this soil contained 9.93 per cent of protein, the crop on the newly broken land 10.1 per cent, and that on summer fallow 13.52 per cent. The difference in favor of summer fallow in this experiment is considered as possibly due to the larger amount of moisture in the newly broken soil. In the third experiment of this kind the Red Fife seed wheat used contained 13.51 per cent, the product on broken land 12.14, and the product on summer fallow 11.78.

The nitrogen content of sound and frosted wheat was studied and the results are given in tables. In 3 samples of sound wheat of as many different varieties the total nitrogen ranged from 2.29 to 2.68 per cent, and the percentage of total nitrogen in the form of albuminoid nitrogen from 94.1 to 96.5. Four varieties of frosted wheat ranged in total nitrogen from 1.87 to 2.47 per cent and the percentage of albuminoid nitrogen from 90.7 to 96.7. Four varieties of badly frosted wheats gave a total nitrogen content varying from 2.12 to 2.59 per cent and the percentage of total nitrogen in the form of albuminoid nitrogen from 83.9 to 90.1. Apparently these results show that in frosted wheat the proportion of nonalbuminoid nitrogen compounds is somewhat larger than in fully ripened grain. It is pointed out that the nonalbuminoid nitrogen compounds are of less nutritive value than gluten, and that hence frosted wheat is inferior to the mature grain although they may have the same total nitrogen content.

It was found that flour from both sound and frosted wheat contains a larger proportion of its nitrogen in the true albuminoid form than does the wheat from which it is made. It is stated that the proportion of total nitrogen in the form of albuminoid nitrogen is apparently as large in the flours from frosted as from sound wheats, and this is considered due to the removal in milling of the embryo and bran which are high in nonalbuminoid compounds.

The tabulated results of potato analyses show the dry matter, ash, and nitrogen content at the time of harvesting, and after several months of storage.

The analyses of the root crops show the moisture, dry matter, and sugar content. For sugar beets the coefficient of purity is also given.

Corn improvement, J. A. JEFFERY (*Michigan Sta. Spec. Bul. 47, pp. 5–27, figs. 23*).—This is a popular discussion on the improvement of corn by means of seed selection and better cultivation and is a revision of Special Bulletin 34 of the station (E. S. R., 17, p. 1060).

Improving the corn crop, L. CARRIER (*Virginia Sta. Circ. 6, pp. 12, figs. 4*).—The improvement of corn by means of grading the seed, and by breeding and selection is briefly discussed.

Experiments with Egyptian cotton in 1908, T. H. KEARNEY and W. A. PETERSON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 29, pp. 22*).—About 40 acres of Egyptian cotton were grown in southern Arizona and southeastern California in continuation of work previously noted (E. S. R., 20, p. 136).

The results from newly imported seed and from seed grown for several years in the Southwest gave further evidence of the need of acclimatization for the production of good yields and a high quality of fiber. Diversity in production as well as in quality in plants from the same stock of seed was observed in various localities of the Colorado River Region, and this is taken as an indication of the need of local adjustment. In 1908 the highest yield was at the rate of 1.2 American bales per acre on a one-fifth acre plat at Yuma. At Sacaton 19 acres produced slightly over 0.5 bale per acre. The strength and fineness of the fiber was generally satisfactory. The experiments at Sacaton further indicated that under some conditions furrow irrigation may give better results than flooding.

The productiveness of the plants was found to be largely influenced by the time of planting, and the time and manner of irrigation. The early planted cotton gave in all cases the best yields. In the Colorado River Region Egyptian cotton hybridized very readily with Upland varieties, and as the fiber from the hybrid plants, although usually of excellent quality, differs in length, color, and texture from that of the pure Egyptian plants, the uniformity of the product is easily lost. It is said that a good stand and a good quality of Egyptian cotton can be expected only on land containing less than one-half of 1 per cent of alkali in the first 3 ft. of soil, although exceptionally resistant individual plants will produce a fair quality of fiber where the alkali content is from 0.5 to 1 per cent.

The reports of spinning and weaving tests of the fiber produced at Yuma in 1907 indicate that the acclimatized Mit Afifi grown in Arizona compares favorably with the better grades of this variety imported from Egypt.

[Analyses of sweet clover], L. G. MICHAEL (*Iowa State Col. Agr. Rpt. 1907–8, pp. 149, 150*).—Two analyses of sweet clover hay are reported. One of the samples contained 22.55 per cent of crude protein, 23.49 per cent of crude fiber, and 33.16 per cent of carbohydrates.

Tobacco, W. H. SCHERFFIUS and H. WOOSLEY (*Kentucky Sta. Bul. 139, pp. 5–36, pls. 16, map 1*).—This bulletin on the cultivation, curing, and marketing of tobacco is published in connection with work conducted in cooperation with the Bureau of Plant Industry of this Department. General discussions on the various steps in growing tobacco are presented, and the results of a fertilizer experiment are reported.

In the fertilizer tests phosphoric acid in the form of acid phosphate applied at the rate of 320 lbs. per acre, gave good results whether used alone or in combination. Where this substance was used the leaves were much longer and broader, and the plants produced a more vigorous growth, which permitted them to be topped higher than on the plats not receiving phosphoric acid. Potash was not so effective as phosphoric acid, and nitrogen made a poor showing in

yield and stand. The quality of the tobacco grown on the different plats was also decidedly in favor of those on which phosphoric acid had been used. These results in general coincide with the chemical analyses of the soil which show that it is short in phosphoric acid, and very well supplied with potash and nitrogen.

Troublesome weeds of the year, S. B. McCready (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 37–41, figs. 2*).—A list of the most troublesome weeds during the year is given and the spread of pepper grass (*Lepidium campestre*), roquette (*Eruca sativa*), Russian thistle (*Salsola kali tragus*), and Barnaby's thistle (*Centaurea solstitialis*) is described. The Barnaby thistle, a new weed in Ontario, is considered as having been probably introduced through impure alfalfa seed.

Repeated sprayings with iron sulphate solution did not eradicate bindweed, but a single thorough application completely destroyed field chickweed. Annual sow thistle, Canada thistle, curled dock, and burdock were apparently little affected by spraying with this substance. On 26 acres of barley sprayed June 26 at a total cost of $17.16 practically all the mustard was killed out by spraying with iron sulphate. The results indicated that the proper time to apply the iron sulphate solution is just before the barley blossoms.

HORTICULTURE.

Horticultural work at the Canadian experiment stations, W. T. Macoun, R. Robertson, J. Murray, A. Mackay, and T. A. Sharpe (*Canada Expt. Farms Rpts. 1907, pp. 96–124, 286–290, 309–314, 337–347, 381–398, pls. 2*).—This consists of progress reports on horticultural work conducted in 1907 at the Central Experimental Farm, Ottawa, and at the Nova Scotia, Manitoba, Saskatchewan, and British Columbia substations. As in previous years (E. S. R., 19, p. 943), considerable data are given on extensive variety tests of vegetables and fruits.

Thirty-two varieties of seedling apples and 1 seedling pear received for examination at the Central Farm in 1907 are described. Seventy-three additional varieties of the seedling apples which were originated on the farm fruited in 1907. Among these were a large number of good varieties, the best of which are described. They are to be tested further relative to their behavior when grafted on other stocks. The one-third acre closely-planted Wealthy apple orchard, which has been reported on several times (E. S. R., 18, p. 140), gave estimated net profits per acre of $112.80 in 1906 and $37.54 in 1907, the crop being rather light and prices low in the latter year. On the basis of the results secured for several years, the method of close planting as here reported is recommended to fruit specialists as being a more remunerative method of growing early-bearing varieties than the regular planting distances of 30 to 36 ft. apart. A list is given of varieties of commercial and domestic fruits recommended for eastern Ontario and Quebec south of latitude 46°.

Observations have been made on winter injury to fruit trees at the Central Farm during the past 20 years. The conclusions drawn and recommendations made relative to this trouble are summarized and include a discussion of 10 forms of winter injury which affect various parts of the tree.

Experimental shipments of tomatoes to Glasgow, Scotland, were made in 1907, from which it appears that Canadian tomatoes can not be profitably shipped to Scotland.

Although it is not believed that apple growing will soon become of commercial importance in Manitoba, a number of varieties are now well established and are yielding good crops at the Brandon Station. Among these are Duchess,

Hibernal, Transcendent, Hyslop, Martha, No. 179, and Repka Kislaga. The last-named variety is of Russian origin and bore fruit for the first time during the past season.

Some data are given on the rate of growth of different varieties of trees growing on the Indian Head Farm, Saskatchewan. The size of fruit is also given for a large number of cross-bred crab apple seedlings which came into bearing during the year.

Descriptions are given of a large number of apples and pears which came into bearing for the first time at the Agassiz Farm, British Columbia, together with data on the varieties of plums, raspberries, blackberries, and currants which have given the best satisfaction at that station.

[Report of] the lecturer in horticulture, J. W. Crow (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 150–158*).—An outline of the work of the year is given, together with notes on the condition of orchard and small fruits and vegetables, self-fertile varieties of apples, variety tests of strawberries, beans, onions and tomatoes, tests of several spraying mixtures, and data on greenhouse investigations with vegetables, and home-canning experiments.

Some experiments in stimulating plants with electricity were carried on in the greenhouse last spring. A current was generated by placing copper and zinc plates in the soil which were connected overhead by an insulated copper wire. In 5 experiments with radishes sown at different dates, the electric current gave an average increase of 9 per cent in weight of root and 14.4 per cent in weight of tops. Electrically stimulated lettuce plants gave an average increased weight of 1.06 oz. per head or a gain of 12.43 per cent.

A test was made of subirrigation versus surface watering with several varieties of tomatoes grown under glass. The subirrigated bed gave yields ranging from 8 to 57 per cent larger than the yields from surface watered beds. With lettuce the average gain per head from subirrigation was 0.53 oz. or about 9 per cent.

Experiments were begun in 1907 in the use of a home-canning outfit, with which 800 gallon cans of tomatoes were packed. A detailed statement is given of the cost of canning based upon one afternoon's work, the total cost being 16.1 cts. per gallon can.

The State Horticultural Society of Norway, 1884–1909, P. Növik (*Norsk Havetidende, 25 (1909), No. 3, pp. 47–102*).—A historical sketch is given of the Havedyrkningens Venner, together with reports relative to the operation and condition of the society and its branches for 1908.

The oleaginous plants, L. Malpeaux (*Les Plantes Oléagineuses. Paris, 1908, pp. X+68, figs 24*).—This work discusses the importance and culture of, and returns secured from, ruta-baga, poppy, rape, and camline, when grown exclusively for the production of oil from their seeds. Briefer notes are also given on the white and black mustards, sunflower, sesame, peanuts, castor-oil plant, and the oil-producing or black guizotia of Abyssinia.

Comparative trials with vegetables grown from Swedish and foreign seed, G. Lind (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 2, pp. 65–94*).—Tabular results are given of cultural tests of bean, sugar pea, cauliflower, cabbage, Swedish turnip and cucumber seed obtained in Sweden and from other countries.

[Report on an irrigation experiment with cabbage], J. B. Davidson (*Iowa State Col. Agr. Rpt. 1907 8, pp. 186–188*).—A summary, together with tabular results, is given of an experiment conducted by the agricultural engineering section in cooperation with the Irrigation Investigations of this Office in irrigating cabbage with sewage.

The sewage was applied to the irrigated portion of the field when needed during the summer, the total amount applied being estimated at 8 in. The irrigated section produced 62,330 lbs. per acre of marketable cabbage, 8,100 lbs. of bursted and soft cabbage, and the nonirrigated section 50,530 lbs. of marketable and 13,310 lbs. of bursted and soft cabbage.

Variety test of lettuce, R. Y. WINTERS (*Florida Sta. Rpt. 1908, pp. XCVI, XCVII*).—Data are given on a comparative test of the hardiness, heading qualities, and times of maturity of 8 heading and 1 nonheading variety of lettuce

[The transmission of sugars by pumpkins], L. G. MICHAEL, S. A. BEACH, and E. E. LITTLE (*Iowa State Col. Agr. Rpt. 1907–8, p. 141*).—A summary is given of a joint study made by the chemical and horticultural sections.

The authors conclude that "The characteristic of tending toward a high sugar content is variably transmissible and not so constant as the tending toward a low sugar content. That is, an appreciable percentage of offspring from a high sugar pumpkin will contain a low percentage of sugar; while the offspring from a medium sugar pumpkin seldom show a high sugar content and the offspring from a low never show a high sugar content and seldom even a medium sugar content."

Tomatoes, A. G. TURNEY (*Ann. Rpt. Ontario Veg. Growers' Assoc., 4 (1908), pp. 58–89, figs. 14*).—A detailed report on the tomato industry of Ontario relative to its extent, methods of culture, cost of production, varieties, yields, returns, marketing, etc.

On parthenocarpie of fruit trees, A. S. DOKTOROVICH-GHREBNITZKIĬ (*Trudui Byuro Prīkl. Bot., 2 (1909), No. 4, pp. 201–250, pls. 4, figs. 6*).—A review of our present knowledge on this subject, together with an account of experiments recently conducted by the author in which he demonstrated in an experimental way that seedless apples can be produced through the castration of the blossom by the apple-blossom weevil (*Anthonomus pomorum*). In carrying on this work one of the experimental trees was divided in two parts by sawing down from the crotch through the root stock, one-half of the tree being used as a control for the other half. The seedless apples were somewhat smaller and more irregular in form than the normal apples.

The economic status of German fruit culture, A. JANSON (*Fühling's Landw. Ztg., 58 (1909), No. 12, pp. 437–450*).—A general discussion of the factors influencing the commercial development of the fruit industry in Germany.

Although Germany imports annually large quantities of fruit and fruit products, it appears that that country ranks second to the United States in the number of fruit trees, and next to Switzerland in the number of trees in proportion to her population. The author attributes the lack of development of the native fruit industry principally to inadequate transportation facilities and poorly regulated freight rates.

One hundred edible fruits of Salvador, D. J. GUZMÀN (*An. Mus. Nac. [San Salvador], 3 (1909), No. 24, pp. 409–422*).—This consists of an enumeration of 100 varieties of edible fruits in Salvador, including notes on their principal characteristics, quality, flavor, etc.

Report of the South Haven Substation for 1908, L. R. TAFT and F. A. WILKEN (*Michigan Sta. Spec. Bul. 48, pp. 3–20*).—Notes are given on the condition and value of the varieties of strawberries, gooseberries, currants, dewberries, raspberries, blackberries, cherries, plums, pears, and apples being tested at the station, including descriptions of those varieties which have recently come into bearing.

A test of cultivation *v.* sod mulch was started with peaches, plums, and apples during the past season, all of the trees being set out in 1907. Last year practically no difference was noted as to the effect of the drought between the

mulched plats and the cultivated plats. The work is to be continued for several years.

The results of spraying experiments are noted on p. 353 of this issue.

Mangoes for export, H. H. COUSINS (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1909), No. 1, pp. 48–51, pls. 4*).—The author points out the importance of the mango industry for Jamaica, and gives brief notes on the varieties, culture, and propagation of mangoes.

Peach growing in Arkansas, E. WALKER (*Arkansas Sta. Bul. 79, 2. ed. rev., pp. 281–285, figs. 7*).—The present edition of this bulletin (E. S. R., 15, p. 871) is somewhat revised in portions to conform with more recent experience and observations on peach growing in Arkansas.

Influence of cultural operations on the growth and yield of grapes, L. RAVAZ (*Ann. École Nat. Agr. Montpellier, n. ser., 8 (1909), No. 4, pp. 231–291, figs. 19*).—The results are given of a number of studies made by the author relative to the influence of various cultural operations on grapes at the time of bud swelling, shoot development, flowering, and maturing, as well as on the yield and quality of the products. Among the influences studied were the effect of the color of the soil on the grapes and on soil and air temperatures, some data on which were reported last year (E. S. R., 20, p. 751), the effect of different planting distances, spring frosts, mulching, time and length of pruning, the number of branches, thinning the vines, the direction of the branches and removal of the suckers. The results are presented in tabular form and fully discussed.

The fertilizer requirements of grapes in the Lower Loire, A. and P. ANDOUARD (*Bul. Sta. Agron. Loire-Inf., 1907–8, pp. 26–50*).—For several years past the authors have studied the composition of the leaves, shoots, marc and must of a large number of grapes of several varieties with a view of determining the amount of each nutritive element removed from the soil every year. The results of these studies for the 3 years, 1905 to 1907 inclusive, are presented in tabular form.

It was found that the 5 varieties which received special attention presented practically the same food requirements. From the data secured in their work, the authors estimate that an acre of grapes requires per year at least 12 kg. of nitrogen, 6 kg. of phosphoric acid, 20 kg. of potash, and 24 kg. of lime. The studies are to be continued.

The grape districts of New York and table of varieties, M. J. DORSEY (*New York State Sta. Bul. 315, pp. 133–161*).—This bulletin consists of a popular summary of the information contained in The Grapes of New York (E. S. R., 20, p. 940). It discusses the natural factors influencing grape culture, gives an account of the location, soil, climate, history and present status of the four great grape districts of New York, and briefly describes the more important species of Vitis, relative to their natural habitat, botanical differences and horticultural importance by way of showing their significance in varieties. A table is also given of 161 of the most important varieties including the species, fruit and vine characters, date and place of origin or introduction, and brief statements of their value for the grower.

Coffee, A. LALIÈRE (*La Café. Paris, 1909, pp. XVI+417+17, pl. 1, figs. 97, maps 2*).—This is a treatise on coffee with special reference to its culture and preparation in the State of São Paulo, Brazil.

In the introduction consideration is given to coffee culture in general. The succeeding portions of the work discuss the details of coffee culture in São Paulo, its commercial preparation, the economic factors in the production of coffee, the commerce, and the valorization of coffee. The appendix contains various statistics on coffee relative to imports and exports, shipments, stocks,

consumption, prices, etc., together with maps showing the general distribution of the coffee industry, and the regions of its culture in São Paulo.

The fertilization of tea, G. A. Cowie (*London [1909], pp. 68, figs. 16*).—A popular treatise on tea culture in which special attention is paid to the manuring of tea. The following phases are discussed: Pruning, plant food, soil, the manuring of tea, green manures, artificial manures, the application of manures, tea manure experiments in Ceylon, how to conduct experiments, and fertilizing mixtures. In presenting this subject the author has drawn largely from the latest results of scientific investigations on tea culture.

Indian tea: Its culture and manufacture, C. Bald (*Calcutta, 1908, 2, ed., pp. 336, pls. 11, figs. 9*).—The present edition of this work (E. S. R., 15, p. 775) has been enlarged and revised to conform with results secured from recent practical investigations on tea culture. Considerable has been added on the subject of green manuring as well as a short chapter dealing with the manufacture of brick tea.

Report on experiments in preparing and shipping copra conducted in the interests of small planters at Coronie (Surinam) in 1907, W. H. A. Van Romondt (*Dept. Landb. Suriname Bul. 17, pp. 22*).—This bulletin contains an account of some cooperative experiments conducted to determine the possibilities of the copra industry for small planters in Surinam, together with the best methods of preparing and shipping the product, market prices, etc.

Tests of outdoor roses, H. L. Hutt and W. Hunt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 159–163*).—Notes are given on a test of outdoor roses, with a list of the most desirable hardy roses recommended for the amateur's garden in Ontario.

Roses and rose growing, Rose G. Kingsley (*New York, 1908, pp. XI +163, pls. 33, figs. 5*).—This popular work is offered as a record of the authors' experience in amateur rose growing. General consideration is given to the making and planting of rose gardens, pruning, and propagating. Succeeding chapters discuss the various types of roses, including notes on origin and culture, and lists of the most promising varieties. The book concludes with a chapter on How to Grow Roses for Exhibition, by F. Page-Roberts. Some of the most promising varieties are illustrated in natural colors.

Gardens past and present, K. L. Davidson (*London [1909], pp. VII+232, pls. 15*).—A popular work on landscape gardening, in part 1 of which the author presents a sketch of some of the aspects of English gardening in the past, and in part 2 the changes which time has accomplished in the English gardens of the present. Various types of gardens are considered, including formal gardens, herbaceous borders, wild, wall, rose, water, rock, bulb, bog, fern and herb gardens. Part 3 discusses plant effects for different seasons of the year.

Gardening and tree planting, F. Börgesen (*Botany of the Færöes based upon Danish Investigations. Copenhagen, Christiania, and London, 1908, pt. 3, pp. 1027–1043, figs. 7*).—A brief account is given of horticultural conditions on the Færöes Islands, including information on the varieties grown and brief cultural notes. Owing to unfavorable climatic conditions, most of the trees and shrubs do not ripen their annual wood. They appear for the most part as large bushes and are grown principally for ornamental purposes.

FORESTRY.

Problems in nursery practice, C. R. Pettis (*Proc. Soc. Amer. Foresters, 4 (1909), No. 1, pp. 42–49*).—A discussion of several problems in connection with the growing of forest seedlings based upon experience gained in the management of the New York State forest nurseries.

Trials of various methods of covering seed beds to procure protection from birds, and at the same time avoid damping-off, has resulted in the use of a box in which both top and sides are of wire. Movable lath screens, together with thick paper inclosing the sides of the box have proved of value in regulating temperature and moisture conditions. With this type of seed bed from 10,000 to 22,000 trees are grown in a 4 ft. by 12 ft. bed. The cost of the wire box is $3 per bed, including lath shade. The best germination is secured by pressing the seeds into and even with the surface of the bed before covering with soil.

Much difficulty having been experienced in regulating the winter cover of the seed beds to conform with the snowfall for any particular season, the plan was successfully adopted of covering the beds with one thickness of burlap placed over about 2 in. of snow. The burlap prevents the melting of the snow and the thawing of the soil underneath, and at the same time is so porous that heating or molding does not occur. It has been found cheaper than a leaf covering. Insect troubles confined chiefly to the attacks of chermes have been practically exterminated by using kerosene emulsion, which is applied as early as possible after the eggs hatch. The loss due to transplanting has been reduced to a minimum by wetting the soil when necessary before planting. This was cheaper than the temporary use of lath shade in dry weather.

The quantity production of the nursery especially with tap root species is increased by transplanting the seedlings when 1 year old. Experiments along this line with Scotch pine show that, as far as this species is concerned, 1-year-old seedlings transplanted 2 years are far larger and stronger plants than 2-year-old seedlings transplanted 1 year. In order to determine the density in production suitable for the Scotch pine, 6, 7, 8, 9, and 10 oz. of seed were sown in 5 different beds. At the end of 2 years there were over 10,000 seedlings in the bed where 8 oz. of seed had been sown, which was about 1,500 more than in the bed where 7 oz. was sown. The trees in both beds were equally good, were raised at the same cost, and were better than in the bed where only 6 oz. of seed were sown. The experiment showed that the use of more than 8 oz. of seed is not desirable as many of the plants are apt to be stunted and suppressed, but the actual production from very dense sowing was fully as good as from the bed where only 6 oz. of seed was sown.

In cooperation with the Forest Service of this Department a series of soil tests was started in the spring of 1907. One 4 ft. by 12 ft. bed was covered with pure muck to a depth of 1 ft., and sown in equal parts with white pine, Scotch pine, and red spruce seed. Thirty-six other beds were used in rows of 6 each. The beds in rows 1 and 2 were covered with layers of muck 6 in. and 3 in. thick respectively. Row 3 was a check, 4 was covered with 3 in. of muck mixed with 3 in. of well rotted manure, 5 had a 3 in. coat of manure, and 6 a 5 in. coat. With the exception of the muck applied 1 ft. deep, these fertilizers were all worked into the soil and thoroughly mixed. White and Scotch pine seeds were sown in all the beds.

An examination of the 2-year-old seedlings showed that wherever muck was used the seedlings are smaller and have a poorer color than on the check bed except in the case where muck was used without soil, which bed compares favorably with the check. The larger the amount of manure used the better the vigor and color of the seedlings. Muck and manure mixed gave poorer results than where the same quantity of manure was used alone.

In addition to the soil test, a top-dressing of finely ground bone meal was applied to one-third of each bed when the seedlings were 1 year old. The results were especially favorable with the pine seedlings on check beds, and where little or no manure was used. The seedlings on muck responded least.

Bone meal applied on the bed in which spruce seedlings were growing killed from one-fourth to one-tenth of the plants. As a result of these tests it is recommended that 1-year-old pine seedlings be top-dressed with bone meal if they are to remain in the seed bed the second year. This dressing, however, should not be applied to spruce.

A frost occurring in the late spring of 1908 nearly ruined all the 1-year-old spruce seedlings in the nursery. The red spruce grown from seed collected in the Adirondacks was more severely injured than any other spruce, the loss of this species being practically 95 per cent in one nursery and about 60 per cent in another. A species of Siberian spruce was damaged almost as much. Norway spruce suffered about 5 per cent loss, and white spruce collected in the Champlain Valley about one-third loss. Engelmann spruce and Colorado spruce suffered very little damage. Japanese larch was all killed, and Siberian larch was uninjured. The planting of Douglas spruce in the Adirondacks is unsuccessful because the frost injures the terminal buds.

A study of the reproductive characteristics of lodgepole pine, G. E. Tower (*Proc. Soc. Amer. Foresters, 4 (1909), No. 1, pp. 84–106*).—A contribution to knowledge relative to the growth and reproduction of lodgepole pine, in which the author endeavors to show, among other things, that aside from the commonly noted differences in the species due to the factors of locality, there is a definite and very distinct variation which is associated with a particular quality in one of the physical factors.

In studying the two distinct phases in the reproductive functioning of the lodgepole pine, one phase being that in which closed cones are produced and remain on the trees for 20 or 30 years, and the other in which cones open at maturity or soon after, the author finds that this difference in the opening of the cones is due solely to a difference in the character of the soil. The closed cones are produced in stands growing on a soil rich in lime, whereas the cones which open at maturity grow on a silica soil or one having a low lime content. The former type has been designated as the lime-form and the latter as the silica-form. The variations in the reproductive functions in these two forms are discussed and suggestions are given relative to securing satisfactory stands of each.

In the lime-form, which was given special study, it was found that the cones were produced yearly with great regularity and investigation was made to determine the relative production of seed in different years. Nine different lots of cones each of different age were taken and the number of seed counted in about 30 cones. From the limited study made it appears that the lime-form produces a fairly uniform amount of seed in periods of 3 successive years, which periods are alternated with a partial cessation of the seed production. The successful reproduction of the lime-form which often follows a fire in the forest is attributed to the fact that heat is an effective means of opening the cones.

A study was made relative to the degree of heat necessary to open the cones and of the effect of the heating on germination. The cones were tested at temperatures differing by 5° and varying from 45° to 100° C. At the end of 15 hours cones which were tried at 40° C. showed no signs of opening, at 45° 6 hours were required to open the cones, at 65° 40 minutes were required, and at 100° they opened in 10 minutes. The effect of simply placing the cones on the ground was also studied. Of 6 cones tested in this way, the first was well opened in 8 days. In 17 days 2 were well opened, 1 more fairly well, and 2 more showed signs of opening, from which results it appears that fire is not absolutely necessary to cause the scale to part. Heating cones at the various

temperatures did not destroy the vitality of all the seed, and a fairly high temperature continued for some time appears to increase the germination percentage.

Tests which were made relative to the germination of seeds of different ages showed that seed that has been preserved in the closed cones 11 and 13 years germinates as readily as seed of more recent production.

Handbook of information on the conifers, L. Beissner (*Handbuch der Nadelholzkunde. Berlin, 1909, 2. ed. rev. and enl., pp. XVI+742, pls. 2, figs. 163*).—This handbook, which first appeared in 1891, has been completely revised and enlarged to include the knowledge gleaned in recent years relative to conifers.

Part 1 contains a systematic classification of all known ginkoes, conifers, and Gnetaceæ. Part 2 consists of botanical descriptions of ginkoes, open-land conifers, and the ephedra species. The nomenclature for each species includes its various synonyms. The descriptions conclude with notes on the practical and ornamental value of the species, together with its adaptation to German conditions. Part 3 treats in detail of the culture of open-land conifers, including mehods of propagation, planting and growing, diseases, insects, and other pests, and the acclimatization of exotic forms.

The effect of late frosts in young beech stands, L. A. Hauch (*Forstw. Centbl., n. ser., 31 (1909), No. 6, pp. 307–322, figs. 12*).—The author reports observations made on the annual growth of several young beech stands which were more or less injured by a late spring frost in May, 1901. He finds that in the lower moist lands where frost usually does the most damage, the danger from frosts is relatively small as long as the regeneration areas are small and surrounded by older stands.

Experimental plantations at Cooper's Hill, W. R. Fisher (*Quart. Jour. Forestry, 3 (1909), No. 3, pp. 228–232*).—This consists of notes on the growth and condition of a large number of species of hardwoods and conifers which were planted in experimental plats on the grounds of the Royal Engineering College, Cooper's Hill, in 1891–92.

Plant formations and forest types, F. E. Clements (*Proc. Soc. Amer. Foresters, 4 (1909), No. 1, pp. 50–63*).—This is an examination of the results of an ecological analysis of vegetation together with a discussion of the ecological kinship of forest types. The author recommends that a thoroughly scientific study of forest vegetation should accompany forestry practices more closely and as soon as possible precede it.

Three pieces of apparatus for determining the properties of timbers especially adapted for biological studies, A. J. Van Schermbeek (*Meded. Rijks Hoogere Land, Tuin en Boschbouwsch., 3 (1909), No. 1, pp. 1–34, pls. 3, figs. 7*).—The author describes and explains the use of 3 pieces of apparatus which he employed in making mechanical tests of green timber. The tests include measures of resistance against normal pressure in the direction of the fiber, flexibility, hardness, resistance to splitting and compression and surface wear.

The practice of forestry, concerning also the financial aspect of afforestation, P. T. Maw (*Brockenhurst, 1909, pp. XIX+503*).—A treatise on British forestry designed for landowners, land agents, and students of the science of forestry.

The introductory chapter discusses the national economic importance of woodlands and the afforestation of land. Succeeding chapters deal in detail with forest systems, nursery and planting operations, individual requirements of trees as to locality and soil, peculiarities of growth, conditions suitable to growth, the tending of young high forest and priming, partial clearances and

underplanting, natural regeneration of high forest, treatment of coppice systems, average yield from forest land, the financial aspect of afforestation, timber measuring, the marketing, sale and transport of woodland produce, sylvicultural notes on broadleaf and coniferous timber trees, measurements for purposes of forest management, and estimation of increment on timber crops. In the appendixes are given height and volume tables, and compound interest tables.

The new reconnaissance—Working plans that work, A. B. RECKNAGEL (*Proc. Soc. Amer. Foresters, 4 (1909), No. 1, pp. 1–21*).—An account of the work of the section of reconnaissance of the Forest Service of this Department, with outlines of the systems employed in gathering the data for the development of a timber sales policy and in making reconnaissance studies and working plans for the National Forests.

Experiment stations on the National Forests, S. T. DANA (*Proc. Soc. Amer. Foresters, 4 (1909), No. 1, pp. 22–29*).—A discussion relative to the location and purposes of forest experiment stations which it is proposed to establish in the National Forests.

Farm forestry, A. AKERMAN (*Forest, Fish and Game, 3 (1909), No. 1, pp. 1–22*).—A popular syllabus on this subject briefly discussing the life processes of trees, the distinguishing characteristics and utility of some of the more important southern timbers, methods of securing stands of different trees, stand protection, thinning the stand, harvesting the final crop and reproducing the stand.

Forestry for railroads, E. A. STERLING (*Proc. Soc. Amer. Foresters, 4 (1909), No. 1, pp. 30–41*).—A discussion of the present relations between railroad corporations and forestry.

The author finds that in spite of the present active agitation in behalf of private forestry, forestry is not finding general application in connection with railroad management. This is attributed partially to the financial condition of some of the railroads, but largely to the fact that the Government is unable as yet to supply sufficiently definite data to the railroads relative to the valuation and selection of timber lands, the kind of trees to grow, cost and profit, the period of maturity, the best timber preserving processes, etc.

Minutes of evidence and appendices thereto accompanying the second report on afforestation of the Royal Commission appointed to inquire into and to report on certain questions affecting coast erosion, the reclamation of tidal lands, and afforestation in the United Kingdom (*Roy. Com. Coast Erosion and Afforest. [Gt. Brit.] Rpt., 2 (1909), pt. 2, pp. VIII+490+II+97, map 1*).—The report which these minutes accompany has been noted in a previous number (E. S. R., 20, p. 1039).

[Report of] the lecturer in forestry, E. J. ZAVITZ (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 231–236, figs. 3*).—This is a progress report on operations in the college woodlots and plantations and the forest nurseries including notes on cooperative planting operations, and an outline of the forest management policy suggested for the new forest station in the South Norfolk waste area. During the past season about 375,000 plants were distributed to cooperators for waste land reclamation.

Administration report of the forest circles in the Bombay Presidency, including Sind, for the year 1907–8 (*Admin. Rpt. Forest Circles Bombay, 1907–8, pp. 200+6*).—This is the annual progress report of operations in the State forests in the northern, central, and southern circles of the Bombay Presidency and in Sind. The report for each circle discusses alterations in forest areas, forest surveying, protection work, sylvicultural and miscellaneous opera-

tions, exploitation, management, and financial results for the year. All of the important data are presented in tabular form.

Progress report on forest administration in the Punjab for 1907–8, C. P. FISHER (*Rpt. Forest Admin. Punjab, 1907–8, pp. 15+XLI+VII*).—Data similar to the above are presented relative to the constitution and management of State forests in the Province of Punjab.

Palo amarillo rubber, P. OLSSON-SEFFER (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3516, pp. 1, 2*).—The author discusses the probable importance of the palo amarillo tree (*Euphorbia fulva*) as a rubber yielding species. This tree, which is a hitherto botanically unknown species, occurs in the dry, semitropic zone on the slopes of the Sierra Madre in Mexico, and has recently been exploited as a desirable source of rubber.

Chemical examination of the latex shows it to contain from 7.3 to 15.7 per cent of rubber and from 19 per cent upward of resins. The latex from the lower parts of the trunk is richer in rubber, the rubber content of the latex from the branches being only from about 3 to 6 per cent. The author is of the opinion that, although the palo amarillo tree can be commercially exploited, the entire supply of the tree is too small to warrant the exaggerated estimates sent out by certain promoters. The resulting rubber is classed as about similar in quality and value to guayule rubber.

DISEASES OF PLANTS.

Plant pathology, V. DUCOMET (*Botanique agricole. Pathologie Végétale. Paris, 1908, pp. X+298, figs. 21*).—This book treats of the fungus and bacterial diseases of plants and is one of the agricultural series published under the direction of J. Dumont. After a general discussion of parasitism and saprophytism, the author describes fungus parasites and their effect on the host, predisposition to disease, and resistance, after which a number of the more prominent fungus and bacterial diseases of plants are described and suggestions given for their control.

A new method of combating parasitic diseases of plants, M. C. POTTER (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 10–13, pp. 379–384, fig. 1*).—This is essentially the same as an article already noted (E. S. R., 20, p. 1137).

The toxic action of Bordeaux mixture and of certain solutions on spores of fungi, J. B. DANDENO (*Rpt. Mich. Acad. Sci., 10 (1908), pp. 58–62*).—The object of the experiments reported was to determine the resisting power of some of the common forms of fungi to certain toxic solutions and also to Bordeaux mixture. The following species were used: *Penicillium glaucum*, *Puccinia asparagi*, *Macrosporium nobile*, *Ustilago maydis*, and *Glomerella rufomaculans*. The chemicals tested were caustic soda, caustic potash, hydrochloric acid, sulphuric acid, copper sulphate, and Bordeaux mixture. All these substances, excepting the last, were used in fractions of normal solutions. The test made was to determine whether the spore was able to germinate and send out a hypha while actually immersed in the liquid.

The results obtained show a number of rather remarkable apparent paradoxes. The spores of Macrosporium were much more injured by solutions of hydrochloric than of sulphuric acid, while the reverse appears to be the case with the spores of Ustilago. The spores of all the fungi, and particularly Ustilago and Macrosporium, proved very resistant to solutions of copper sulphate. Caustic potash and caustic soda did not show any results of great importance, although the caustic potash appeared more toxic than the soda solution.

Corn smut was found to survive solutions of Bordeaux mixture of full strength and double strength, but was destroyed by one-half and one-fourth strengths. Macrosporium was not quite so resistant as corn smut, but grew readily in half-strength solution. The spores of Glomerella did not grow in any of the Bordeaux mixtures.

The last chemical tested was the supernatant liquid of Bordeaux mixture, and this was found toxic to Glomerella spores when used in a dilution as weak as 1:16. In double strength it was also toxic to spores of Ustilago and Macrosporium.

Fungicides and insecticides, F. T. SHUTT (*Canada Expt. Farms. Rpts. 1907, pp. 165–173*).—Studies are reported on the effect of exposure on solutions of formaldehyde, the action of certain fungicides on the vitality of wheat, and the composition of lime-sulphur washes and a number of proprietary insecticides and fungicides.

Formaldehyde in uncorked bottles or open dishes is said to concentrate rapidly, becoming polymerized and in part solidified, so that the strength of the solution increases very materially.

In studying the action of certain smut preventives on the vitality of wheat, comparisons were made between different strengths of formaldehyde and copper sulphate solution. It was found that there was some depreciation in vitality in all the lots treated, the greatest loss being where a strong copper sulphate solution was employed. The effect of allowing grain to stand after treatment was also investigated, and as a result it is recommended that but little delay in sowing the grain should follow after treatment. Where seed grain has been injured by frost, in treating it for smut a solution of formaldehyde not stronger than 1 lb. in 48 gal. should be used.

Analyses are reported of lime-sulphur wash used for San José scale and fungus diseases, 2 trade preparations of the same, and 2 proprietary fluids for which value as insecticides and fungicides is claimed. The proprietary fluids consisted in the main of crude carbolic acid, nonsaponifiable petroleum oils, saponifiable oils, and caustic soda. Vaporite, another commercial product, was analyzed and found to consist of 25 to 30 per cent naphthalene oils and 70 to 75 per cent gas lime. Anti-fungi, a trade preparation, was found to consist of 54.5 per cent iron sulphate, 44.9 copper sulphate, and a small quantity of ether extract. While the material has a fungicidal value, its cost is believed to be entirely out of proportion to the price of the chemicals.

Treatment of grain for smut, C. A. ZAVITZ (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 183, 184*).—For several years, as previously noted (E. S. R., 19, p. 1150), studies have been carried on for the prevention of smut in wheat and oats by treating the seed in different ways. The treatments have consisted of immersion and sprinkling with dilute formalin, immersion in hot water, in copper sulphate solution for 12 hours, in copper sulphate solution for 5 minutes, and in potassium sulphid solution for 2 hours, and sprinkling with copper sulphate solution.

The results, as shown by inspection of the fields, are tabulated, from which it appears that the several treatments have been quite successful in preventing the development of stinking smut in wheat and loose smut in oats. There was some slight injury to the germination of the seed in some instances, but the greatest yields of both winter wheat and oats per acre were produced where the seed had been immersed in the formalin solution, 1 pt. to 42 gal. of water, for a period of 20 minutes.

Diplodia disease of maize, E. F. SMITH and FLORENCE HEDGES (*Science, n. ser., 30 (1909), No. 758, pp. 60, 61*).—A preliminary report is given of investigations which the authors have been carrying on for two years with special

reference to the manner of infection in the Diplodia disease of corn. Their experiments seem to indicate that the fungus occurs in the soil and that under certain conditions it may infect the growing plants.

The question is raised as to whether this Diplodia may not be the cause of the so-called cornstalk disease prevalent among cattle in the West and possibly also responsible for the disease pellagra that has been reported in the southern part of the United States during the past three years.

A disease of cotton, G. FRON (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 1 pp. 66–68, fig. 1*).—An account is given of a fungus disease of cotton which is said to prevail in the western part of Africa, particularly in Dahomey, where it has caused considerable loss.

The disease is characterized by the browning and drying of the leaves and the arresting of the growth of the bolls, which never mature nor open. It spreads with great rapidity through the fields, and an examination of specimens showed that the fungus is localized on the branches and extends but slightly on the older stems. The terminal branches and petioles seem to suffer the most. Upon these canker-like growths are formed. A study of the material showed that the disease is due to a species of Phoma, to which the name *P. roumii* n. sp. is given.

Fungus diseases of vegetables, J. W. EASTHAM and J. E. HOWITT (*Ontario Dept. Agr. Bul. 171, pp. 37–62, figs. 11*).—Popular descriptions are given of a number of the more common fungus diseases of vegetables, together with suggestions for their control. The arrangement is according to the host plants.

Directions are also given for the preparation and application of a number of the better known fungicides and insecticides.

Report of assistant in botany, R. Y. WINTERS (*Florida Sta. Rpt. 1908, pp. XCVII–CIV*).—Brief reports are given on celery diseases, the bacterial disease of lettuce and the lettuce drop, with suggestions for their control.

It is popularly believed that certain fertilizers influence the presence of the disease of celery known as black heart, and a series of experiments was carried on in which 36 formulas of fertilizers were tested. Plats receiving nitrate of soda and kainit were uniformly severely attacked by the disease, and those plats which received fertilizers consisting of bone meal, fish scrap, and high-grade sulphate of potash gave best results. As a result of the studies, it seems that some physical weakness of the plant makes it susceptible to infection and that certain forms of fertilizers produce plants more susceptible to this disease than others.

Foot rot (*Sclerotinia libertiana*), which it is said has proved very destructive to celery, and the celery blight (*Cercospora apii*) are described.

[**Notes on some diseases of cabbage, lettuce, roselle, rose, and water oak**], H. S. FAWCETT (*Florida Sta. Rpt. 1908, pp. LXXV–LXXXIX, pls. 3*).—An account is given of the black rot of cabbage, due to *Pseudomonas campestris*, including a general description of the disease and suggestions for its prevention.

Attention is called to a bacterial rot of lettuce, which though quite distinct from the lettuce drop, due to *Sclerotinia libertiana*, is often associated with that disease. The author isolated the organism causing the disease, cultivated it in various media, and carried on a series of inoculation experiments resulting in the production of typical forms of the bacterial disease.

It is stated that other bacterial diseases of lettuce have been reported, and that one, described by Voglino (E. S. R., 16, p. 1093), was due to an organism to which he gave the name *Bacillus lactucæ*. The bacterium causing the disease in Florida has not been fully identified with this organism.

The rose disease described is a mildew (*Sphærotheca pannosa*), for the prevention of which spraying with potassium sulphid solution is recommended.

The author reports the occurrence of *Microsphæra euphorbiæ* on roselle, and on the basis of the investigations of Bessey, dusting the plants with sulphur while wet with dew is suggested as a means for control.

A brief note is given on the occurrence of *Fomes marmoratus* on the water oak (*Quercus aquatica*).

Report of assistant plant physiologist, B. F. Floyd (*Florida Sta. Rpt. 1908, pp. XC–XCV, pl. 1*).—The investigations reported have been largely confined to studies in plant nutrition. Morphological and cytological studies have been begun on citrus, pineapple, and cassava plants. A description is given of a leaf spot of citrus trees, the exact cause of which is not definitely determined, and of chlorosis of cassava, with which no organisms appear to be associated.

Winter stage of Sclerotinia fructigena, J. B. Dandeno (*Rpt. Mich. Acad. Sci., 10 (1908), pp. 51–53, pls. 3*).—A study was made of the winter stage of *Monilia fructigena* on plums. In the fall of 1905 diseased plums abundantly affected with the conidial stage were planted in various situations to furnish laboratory material. An examination of the material was made and information secured regarding the development of the ascus stage.

It was found that when infected fruits were placed on the surface of the ground among dead, long grass, near the foot of the trees, there was an abundant production of Sclerotinia, while those in the open, on the naked ground, either on top of the soil or underground, did not produce any. When on top of the soil the fruits completely dried and when underground they rotted without producing the winter forms.

In sod, where the surface soil is not disturbed and the old fruits are protected by grass, the ascus stage is developed. This has a practical bearing on the subject of control, and it is suggested that orchards should be plowed in the fall and the ground dug over, thus covering all the old fruits so that the fungus will not survive. The presence of cover crops is held to be favorable for the development of the fungus.

Citrus diseases, H. S. Fawcett (*Florida Sta. Rpt. 1908, pp. LXIV–LXVII*).—The principal investigations carried on by the author during the past year have been on the diseases of citrus trees, particular attention being paid to the scaly bark disease, an account of which has already been given (E. S. R., 20, p. 1045).

In the present report brief accounts are given of the scaly bark, smoky fungus, withertip, gumming, and scab.

A disease of the cacao, E. Griffon and C. Maublanc (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 1, pp. 51–58, figs. 2*).—A study was made of diseased branches and roots of cacao trees, the specimens having been received from French Kongo. These were found to be infested with a fungus which was recognized as that described by Prillieux and Delacroix (E. S. R., 6, p. 909) under the name *Macrophoma vestita*.

Further studies were made of the fungus, and as a result the authors claim that a number of the species of fungi described by different authors as attacking cacao are in fact the same species. Of these *Botryodiplodia theobromæ*, *Macrophoma vestita*, *Diplodia cacaoicola*, and *Lasiodiplodia nigra* should be combined under one species, the proper name of which, according to the rules of nomenclature, would be *Lasiodiplodia theobromæ*.

Tea root diseases, T. Petch (*Indian Planters Gaz., 51 (1909), No. 23, pp. 795, 796*).—Attention is called to the apparently selective parasitism of *Rosellinia bothrina* on tea and other plants, spreading from the roots or stumps of one species to those of another, but often passing related forms.

In the case of the tea root fungus (*Ustulina zonata*), which is spread by spores, the fungus is found to grow also on stumps of Grevillea and to cause

a root disease of the pomelo. It has also been found on the coconut, but probably it is only saprophytic on this host. It is said that this species does not often form fruiting bodies on the tea plant, since the bushes die and are usually uprooted before the mycelium has ascended in the stem to the ground level.

Physiological diseases of the vine, F. T. Bioletti (*Pacific Rural Press, 78 (1909), No. 1, p. 5*).—Popular descriptions are given, with suggestions for prevention so far as means are known, of a number of physiological diseases of the vine. The forms most generally recognized are said to be folletage and apoplexy, rougeot and red leaf, brunissure, the Anaheim disease, and sunburn.

The coulure of the vine, F. T. Bioletti (*Pacific Rural Press, 77 (1909), No. 22, p. 401*).—The author describes the coulure of grapes, two conspicuous forms of which are noted. The first is characterized by the failure of the flowers to set, or by the berries dropping off without growing, while the second is indicated by the falling of the berries after they are well formed. To the first the name early coulure is given, while the second form is called late coulure, or, as it is commonly known in the United States, shelling.

A number of causes of this disease are described, among them the presence of imperfect flowers, excessive vigor, which results in a tendency to the production of abnormal flowers, and unfavorable weather. The variety of grapes known as Muscat seems to be predisposed to this trouble, and the cause lies in the structure of the flower, which is said to lead to imperfect pollination.

The black rot of the grape and its control. Second report, C. S. Wilson and D. Reddick (*New York Cornell Sta. Bul. 266, pp. 391–411, figs. 12*).—In continuation of the previous report (E. S. R., 20, p. 249), the authors give an account of spraying experiments for the control of the black rot of the grape (*Guignardia bidwellii*). The correlation between rainfall during the growing season and the abundance of black rot has been pointed out in France, and the authors have verified these relationships when applied to New York conditions.

The previous investigations on methods of control are briefly reviewed which indicated that a moderate degree of spraying will control the black rot, that iron sulphate as a fungicide is of little value, that the addition of a sticker, such as resin, fish oil soap, etc., is of no practical value, that burning the tendrils on the trellis is a means of destroying some of the winter spores, and that the times of application of the fungicide bear an important relationship to the control of the disease.

In 1908 experiments were carried on to demonstrate on a commercial scale that black rot can be controlled and also to determine the minimum strength of mixture, the value of cultivation in the control of the disease, and the best time to apply the mixture in relation to the blooming period and the weather conditions.

The results of the experiments give evidence that the rot can be controlled commercially by thorough spraying with mixtures properly made and applied, although it has not been demonstrated that spraying will control the rot in exceptionally wet seasons.

For the control of the black rot the authors recommend the plowing of the vineyard to cover all the rotten clusters and leaves, keeping down the weeds and grass, the destruction of mummied fruits, keeping the vines off the ground, and thorough spraying, the spray to be applied at a pressure of at least 100 pounds. The applications will depend on the weather, and contrary to the common belief, it is recommended that the spray be applied before rather than after a rain. In general the first spraying should be with a 5:5:50 Bordeaux mixture at the time when the second or third leaf is showing, followed by a second application just before the blossoms open, and a third soon after they

have fallen. About 2 more applications should be given at intervals of 10 days to 2 weeks, depending upon the weather conditions.

Lathræa clandestina, a parasite of the vine, A. Col (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 22, pp. 1475, 1476; Rev. Vit., 31 (1909), No. 807, pp. 621, 622*).—An account is given of an injury to grapes in Loire-Inférieure, France, which was found to be due to a phanerogamic parasite (*L. clandestina*). Additional studies are being carried on to determine the method of attack and means for control of the parasite.

Carnation root knot, H. Garman (*Kentucky Sta. Bul. 142, pp. 207–216, pls. 4, figs. 3, dgm. 1*).—The author's attention was called to a diseased condition of carnations in which the plants were stunted and the roots covered with an extensive development of swellings and knotty growths. An examination of these swellings showed that the plants were infested with nematodes, and the author believes that the species present was that commonly described in Europe under the name *Heterodera radicicola*. In addition to carnation plants, a large number of other plants in the station conservatory have shown that they are subject to attack.

Various methods of treatment are described at some length, and in conclusion the author suggests the destruction of all plants if badly infested, the freezing of the soil during winter, and drying and sterilizing by heat during summer. For outdoor treatment, the practice often followed in Europe of planting trap crops is recommended.

Mycorrhizæ on Michigan trees, G. A. Duthie and D. M. Matthews (*Rpt. Mich. Acad. Sci., 10 (1908), p. 46*).—An examination was made of 26 species of forest tree roots to determine the presence of mycorrhizæ, and 16 were found to be associated with ectotrophic mycorrhizæ, 7 with endotrophic, while 3 were apparently free from any fungal affection. The ectotrophic species were the red, white, and black oak, tamarack, Norway pine, chestnut, American elm, mockernut and bitternut hickories, beech, blue beech, ironwood, black cherry, trembling aspen, poplar (*Populus grandidentata*), and paper bark birch (*Betula papyrifera*), while the endotrophic species were swamp and sugar maple, basswood, horse chestnut, walnut, butternut, and sycamore. Those which showed no mycorrhiza, so far as the authors were able to determine, were black and white ash and willow. A superficial examination of the tulip tree, *Ailanthus glandulosa*, and papaw seemed to indicate that they too were unaffected.

Mycorrhiza-producing Basidiomycetes, L. H. Pennington (*Rpt. Mich. Acad. Sci., 10 (1908), pp. 47–50*).—A study made of recent literature shows that little investigation has been reported regarding endotrophic mycorrhiza, and a series of studies was carried on to determine the relationship of the fungus to mycorrhiza. A number of species of Basidiomycetes have been reported as producing mycorrhiza upon the roots of trees, and the author's observations have shown that *Russula emetica*, *Boletus speciosus*, *Tricholoma transmutans*, and an undetermined species of *Cortinarius* produce mycorrhiza on certain species of oaks. It is further reported that *B. speciosus* produces sclerotia, and it is said that this seems to be the first time that sclerotia have been reported in connection with Boletus and with mycorrhiza.

Diseases of chestnuts in the United States and Europe, E. Henry (*Ann. Sci. Agron., 3. ser., 4 (1909), I, No. 4, pp. 241–251*).—Descriptions are given of the disease in America caused by *Diaporthe parasitica* (E. S. R., 19, p. 250) and of the disease in Portugal and elsewhere which is characterized by the blackening of the roots due to a tannic exudate coming in contact with iron salts in the soil. Bacteria and the mycelium of fungi have been found in connection with the diseased roots but the exact cause has not yet been positively determined.

The oak mildew, E. GRIFFON and C. MAUBLANC (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 1, pp. 37–50; abs. in Rev. Sci. [Paris], 47 (1909), II, No. 1, pp. 20, 21*).—An account is given of the oak mildew, which prevailed in forests of France and other parts of Europe in 1907 and which became especially noticeable in 1908. The authors show that, contrary to previous observations, the American species of oak are subject to this mildew, and that it does not seem to be especially limited to oaks but also attacks the beech, elm, and chestnut.

From the botanical standpoint, the mildew is of interest, and a number of writers have suggested its relationship to various species of Erysiphaceæ, particularly *Microsphæra alni* and *Phyllactinia corylea*. The authors consider the relationship between the oïdium form and the Microsphæra as very doubtful and that its affinity with Phyllactinia is not proved. They seem to favor the opinion that it can not be safely associated with any of the known species of Erysiphaceæ.

The origin of the invasion of the mildew is discussed at some length. The authors state that opinions seem to differ as to whether it is an indigenous species which has made an unaccountable development or whether it is an introduced fungus, like the grape mildew, rot, etc.

A disease of Zizyphus baclei, P. HARIOT and N. PATOUILLARD (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 1, pp. 13, 14; Rev. Sci. [Paris], 47 (1909), I, No. 24, p. 758*).—An account is given of the occurrence of a fungus upon the fruits of *Z. baclei* in Africa. The fruits were badly deformed and covered with a yellowish white powder. The fungus was determined and is described by the authors under the name *Coniodictyum chevalieri* n. sp.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The brown rat in the United States, D. E. LANTZ (*U. S. Dept. Agr., Bur. Biol. Survey Bul. 33, pp. 54, pls. 3, figs. 4*).—The author describes the rat as the worst mammalian pest known to man. Its depredations throughout the world result in losses amounting to hundreds of millions of dollars annually.

After discussing the distribution of the genus Mus in America, the history of the brown rat and the habits of rats in general are taken up. The damage by rats is considered under the headings of grains, poultry and eggs, game and other birds, fruits and vegetables, merchandise in stores and warehouses, flowers and bulbs, fires, damage to buildings and furniture, and miscellaneous damage. The part that the pest plays in the transmission of bubonic plague is briefly reviewed. Trichinosis among swine is probably perpetuated entirely by rats. The probability that many disease germs adhere to rats' feet and are carried to places where they threaten human health is mentioned. Ptomaines are sometimes said to be conveyed to meats or other human foods in this way. Hygienic considerations are stated to furnish the strongest argument for the extermination of rats.

The more important means of fighting rats are discussed at some length under the captions, natural enemies of the rat, rat-proof construction of buildings, keeping food from rats, driving away rats, and destroying rats, including trapping, poisoning, and contagious diseases. The author has drawn a summary of the more important aids in limiting the number of rats and reducing the losses from their depredations, which is as follows:

"(1) Protection of our native hawks, owls, and smaller predatory mammals—the natural enemies of rats.

"(2) Greater cleanliness about stables, markets, grocery stores, warehouses, courts, alleys, and vacant lots in cities and villages, and like care on farms and suburban premises. This includes the storage of waste and garbage in tightly covered vessels and the prompt disposal of it each day.

"(3) Care in the construction of buildings and drains so as not to provide entrance and retreats for rats, and the permanent closing of all rat holes in old houses and cellars.

"(4) The early thrashing and marketing of grains on farms, so that stacks and mows shall not furnish harborage and food for rats.

"(5) Removal of outlying straw stacks and piles of trash or lumber that harbor rats in the fields.

"(6) Rat-proofing of warehouses, markets, cribs, stables, and granaries for storage of provisions, seed grain, and feedstuffs.

"(7) Keeping effective rat dogs, especially in city warehouses.

"(8) The systematic destruction of rats, whenever and wherever possible, by (*a*) trapping, (*b*) poisoning, and (*c*) organized hunts.

"(9) The organization of 'rat clubs' and other societies for systematic warfare against rats."

Key to animals on which wolf and coyote bounties are often paid, V. Bailey (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 69, pp. 3, dgm. 1*).—The author calls attention to the fact that the bounty system has everywhere proved an incentive to fraud and that thousands of dollars are wasted annually in paying bounties on coyote scalps offered in place of wolves, and on the scalps of dogs, foxes, coons, badgers, and even cats, which are palmed off for wolves and coyotes.

"If in all States having the bounty system whole skins, including nose, ears, feet, and tail of both adult and young animals, were required as valid evidence for bounty payments, the possibility of deception would be reduced to a minimum. The common practice of paying bounty on scalps alone, or in some cases merely the ears, is dangerous, as even an expert can not always positively identify such fragments. A satisfactory way of marking skins on which the bounty has been paid is by a slit 4 to 6 in. long between the ears. This does not injure the skins for subsequent use. If all bounty-paying States would adopt such a system, the possibility of collecting more than one bounty on the same skin in different States would be avoided."

Keys are given as an aid to county and State officers in identifying scalps, skins, and skulls of wolves and coyotes, the pups of wolves, coyotes, red, gray, and kit foxes, and young bobcats, coons, and badgers. A diagram showing the relative size of nose pads, heel pads of front feet, and diameter at base of upper canine teeth of wolves and coyotes is also included.

The blue foxes of the Pribilof Islands, J. Judge (*Abs. Science, n. ser., 29 (1909), No. 745, pp. 598, 599*).—This is an abstract of a paper presented before the Biological Society of Washington, in which the author discussed the life history and habits of the blue foxes of the Pribilof Islands. Methods used in trapping, artificial feeding, etc., are considered.

Proceedings of the twenty-first annual meeting of the American Association of Economic Entomologists (*Jour. Econ. Ent., 2 (1909), No. 2, pp. 89–174, pls. 2*).—This is a continuation of the report of the proceedings previously noted (E. S. R., 1, p. 55).

J. G. Sanders in a paper entitled, Notes on Insect Photography and Photomicrography (pp. 89–95) considers the methods and details necessary for the best results, and R. A. Cooley discusses Photomicrography of the Diaspinæ (pp. 95–99). The importance of proper methods in entomological investigations is emphasized in a paper by F. M. Webster (pp. 99–108).

In a paper entitled, Biological Notes on *Murgantia histrionica*, R. I. Smith presents the results of a study made of this pest (pp. 108–114). The egg-laying habits, number of eggs deposited by different generations, incubation period, number of generations annually, and length of life cycle are considered in detail.

E. F. Phillips discusses Means whereby the Economic Entomologist can Advance Apiculture (pp. 115–117), and B. N. Gates A Method of Securing Apicultural Statistics (pp. 117–120). Types of Cages Found Useful in Parasite Work, described by C. E. Hood (pp. 121–124), are accompanied by photographic illustrations. In a paper on Tree Crickets and Injury to Apple Wood, P. J. Parrott presents observations and studies made of the habits of *Œcanthus niveus* and *O. nigricornis* in depositing their eggs in the bark of apple trees and raspberry bushes (pp. 124–127).

In considering The Distribution of San José Scale in Iowa, H. E. Summers states that the pest has been found doing injury in only 5 counties (pp. 127–129). In discussing this paper, F. L. Washburn mentions the occurrence of the pest at Madison, Wis., and in South Dakota. A paper on The Self-Boiled Lime-Sulphur Mixture as a Summer Treatment for the San José Scale by A. L. Quaintance discusses the experiments that have been conducted under his direction (pp. 130–135). The results indicate that while there is but little immediate effect on the older scales, the crawling young and recently set individuals are killed or fail to establish themselves owing to the presence of the wash upon the trees. As a result, as the old insects die the scale gradually disappears.

In continuation of experiments previously noted (E. S. R., 20, p. 553), E. D. Sanderson presents Notes on Recent Experiments for the Control of the Codling Moth (pp. 135–142). The results of 3 years' work are said to show a necessity for the most careful arrangement of plats and recording of data in order to secure definite results. The question, Is Arsenical Spraying Killing our Fruit Trees, is considered at some length by E. D. Ball (pp. 142–148), who concludes that the subject is a matter for careful and exhaustive investigation and that any statements preceding such investigation should be of the most guarded nature.

E. G. Titus presents information upon The Alfalfa Leaf Weevil (pp. 148–154). This insect (*Phytonomus murinus*), which has long been known as a serious pest of alfalfa in Europe, has been introduced into this country and is seriously injuring alfalfa in Utah. Unfortunately the weevil is beginning to turn its attention to sweet clover (*Melilotus alba*), yellow clover (*M. officinalis*), and red clover (*Trifolium pratense*) also. Its life history and habits are here considered.

An experiment in the control of curculio on peach is described by E. P. Taylor (pp. 154–160), who considers the following points to be established: "The increase of lead arsenate in the spray formula increases the danger of injury. The addition of lime to lead arsenate for peach spraying reduces the danger of injury. The use of lead arsenate as dilute as 2 lbs. per 50 gal. with the addition of 4 lbs. of lime is not always safe for peach spraying. Early applications of lead arsenate upon peach are less likely to cause injury than those of the same formula applied later. Lead arsenate used upon peach should be practically free from uncombined water soluble arsenic and should contain a maximum amount of arsenious oxid."

Under the title, Carbon Disulphid Fumigation for Grain Infesting Insects, W. E. Hinds discusses the results obtained from preliminary experiments with corn and cowpeas and the pests *Calandra oryza*, *Silvanus surinamensis*, and *Bruchus chinensis* (pp. 161–168). A Summary of Fumigation and Dipping

Experiments is given by T. B. Symons (pp. 169–174), in which it is concluded that the varying results show that further experiments are necessary in order to establish what may be expected from such treatment.

Report of the entomologist, E. W. BERGER (*Florida Sta. Rpt. 1908, pp. XLVIII–LXIII, pl. 1*).—Part 1 of this report is devoted to investigations made during the year of the white fly, a partial account of which has been previously noted (E. S. R., 20, p. 1053). In experiments as to methods it has been found that the period of summer rains is the most favorable time for introducing fungus parasites; also, that it is possible to introduce such fungi to the end of November at least by the spore-spraying method. Observations on the red and yellow Aschersonias point to the conclusion that the white fly spreads the fungi. Attention is again called to the fact that under certain conditions the white fly matures on detached leaves. During the year the pest made its appearance at Palm Beach and Geneva. The pomegranate bush was found in one locality serving as a host plant for the pest. The twice-stabbed ladybird (*Chilocorus bivulnerus*) was found to feed upon the white fly. The press bulletins and addresses of the year are listed in part 2.

In part 3 several injurious insects are considered. A scale infesting guava and Ficus, *Pulvinaria psidii*, is reported to have been found in Florida, this being the first occurrence of this destructive pest in the United States. *Lachnopus hispidus* and an undetermined species of the same genus were received at the station, with the report that they were the source of injury to oranges in Porto Rico. The seed-corn maggot fly (*Phorbia fusciceps*) was discovered near Gainesville, where the maggots were destroying seed potatoes, peas, radishes, and onions.

Report of the entomologist and botanist, 1907–8, J. FLETCHER (*Canada Expt. Farms Rpts. 1907, pp. 183–213, pl. 1*).—The scarcity of insects of all kinds during April and May of 1907 is said to have had a direct effect on bird life, as well as in many places also upon fruit crops.

The Hessian fly occurred in the maritime provinces in several localities, but only in Prince Edward Island was noticeable injury reported. The wheat-stem saw fly (*Cephus occidentalis*) appeared in central Manitoba and the eastern part of Saskatchewan in much more serious numbers than at any previous time. The wheat jointworm (*Isosoma tritici*), which in Prince Edward Island has been the source of considerable loss from year to year, is believed by some correspondents to be rapidly spreading throughout the province. Specimens of the green bug (*Toxoptera graminum*) were received from Emerson, Manitoba, but these had merely spread over the border from an infestation a few miles to the south in Minnesota and did no injury in the Manitoba wheat fields. Serious complaints were made of injury in Manitoba and the eastern part of Saskatchewan, due to the grain aphis (*Macrosiphum granaria*). Locusts were injuriously abundant in some places in eastern Ontario along the Quebec shore of the Ottawa River, considerable injury being done to pastures and growing crops. The pea weevil is apparently increasing in numbers.

The codling moth in western Ontario was so destructive in some places that several fruit growers discussed seriously the advisability of cutting down their apple trees and planting grapes or peaches. This part of the province is within the area where there are two regular broods of codling moth in the season, the latter of which is by far the more destructive. Owing possibly to the inclement season the increase of the oyster-shell scale in the summer of 1907 was particularly noticeable.

Although the San José scale spread to new orchards it did not invade new territory in Ontario, where the San José scale inspector for the province reported

that never before had there been so much done by fruit growers for the destruction of the scale. Nursery stock can be imported into Canada only at Vancouver, B. C., Winnipeg, Man., Windsor, Ont., Niagara Falls, Ont., St. John's, Que., and St. John, N. B. At these points the Dominion government maintains houses for the fumigation of all nursery stock entering from countries known to be infested by the San José scale. The formula used at these stations is 1 oz. of cyanid of potassium (98 per cent), 1 oz. of commercial sulphuric acid (66°B.), and 3 oz. of water for every 100 cu. ft. of space, and all nursery stock is exposed to the gas generated by this mixture for 45 minutes.

Depredations by the rose chafer (*Macrodactylus subspinosus*) were so serious that in many vineyards the whole crop was destroyed. In combating the brown-tail moth in Nova Scotia, a bounty of 10 cts. per nest was paid on about 3,500 nests after identification by stated qualified officials. Throughout the whole of eastern Canada considerable damage was done to forest trees of several kinds, such as hickory, elm, birch, ash, and basswood by the hickory tussock moth (*Halisidota caryæ*). The rusty tussock moth (*Notolophus antiqua*) was the source of injury to apple and other fruit trees.

The report of the apiarist, D. D. Gray, is included. Instructions are also given for the sending of insects through the mail.

[Report of] the professor of entomology and zoology, C. J. S. Bethune (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 24–35, figs. 3*).—Among the forest and shade tree insects of which reports were received from correspondents were the fir sawfly (*Lophyrus abietis*), which defoliated peach trees at Whitby; the larch sawfly (*Nematus erichsonii*), which destroyed enormous numbers of tamaracks on the north shore of Lake Superior; and the carpenter ant, which injured basswood trees. *Gossyparia ulmi* appeared in large numbers on an elm at Toronto, while the spruce gall louse, tussock moth, pigeon tremex, and Eriophyes galls were very abundant.

Farm crops were as a rule little affected during the year under report, the chief injury being that to turnips and cabbage by plant lice. The brown rot fungus (*Sclerotina fructigena*) was found to be the probable cause of the abnormally large amount of gummy exudation on peach trees in Niagara County. A vigorous warfare is reported to have been carried on in various districts against the oyster-shell scale as a result of which many orchards are now almost free from the pest. The leaf blister mite of the apple and pear is rapidly spreading. In Prince Edward County the apple maggot was a source of considerable damage. Much of the injury that has been charged to the lesser apple worm is considered to be due to other pests. The fruit-tree bark beetle threatens to become very destructive in the Niagara district.

In reporting insecticide experiments it is stated that poisoned bran was found to be remarkably successful as a remedy for cutworms. Pyrethrum used dry is reported to have killed all the cabbage worms and chrysalids that it came in contact with. Kerosene emulsion at the strength of 6¾ per cent kerosene, whale-oil soap 1 lb. to 6 gal. of water, and soapsuds 1 lb. of soap to 4 gal. of water all gave about the same results when used against plant lice. A test made with the commercial lime-sulphur seemed to indicate that this mixture at the ordinary recommended summer strength would not kill the apple aphis.

The gipsy and brown-tail moths, W. Stuart (*Vermont Sta. Circ. 2, pp. 4, figs. 9*).—While these two pests have not yet invaded Vermont, they may be expected to do so at any time. Illustrations are presented of the stages of the pests, in order that they may be identified and dealt with when they appear.

The life history of the Argentine ant, W. Newell (*Jour. Econ. Ent., 2 (1909), No. 2, pp. 174–192, pls. 3, figs. 4*).—This is a detailed account of in-

vestigations made of the life history of *Iridomyrmex humilis*, a general account of which has been previously noted (E. S. R., 20, p. 252).

On certain seed-infesting chalcis flies, C. R. Crosby (*New York Cornell Sta. Bul. 265, pp. 367–388, pls. 4, figs. 23*).—A great majority of the chalcis flies, of which more than 5,000 nominal species have been described, are beneficial since they prey as parasites on other insects. A small number, however, probably not over 100 species, are known to have vegetable-feeding habits.

The life history of the apple-seed chalcis (*Syntomaspis druparum*) previously noted (E. S. R., 20, p. 763) is here described. This species passes the winter as a larva inside the apple seeds either on the ground or more rarely clinging to the trees. In the latter part of May the larvæ transform to pupæ and in June the adults appear. As a rule the smaller-size varieties of fruits are more subject to the attacks of this insect. This species seems to be generally distributed in New York, but only two or three infested seeds were found in a half bushel of various kinds of cider apples received from Randolph Center, Vt. Mokshetsky reports that in Crimea the presence of the larva causes the fruit to drop prematurely, but this does not seem to be the case in this country. In some varieties, however, considerable injury is caused by the punctures made by the female in depositing her eggs. These appear in the mature fruit as minute black dots, occupying more or less distinct depressions and give the apple a decidedly knotty form. "As the insect remains in the seed throughout the winter a complete destruction of all the apples left under the tree in the fall would doubtless prove an effective remedy. As the adults are good fliers the treatment should be extended to as wide an area as possible."

The sorbus-seed megastigmus (*Megastigmus brevicaudis*) has been found by the author to invest a large proportion of the seeds of berries from the mountain ash at Ithaca, Weedsport, Jamesville, and Wayland, N. Y. This species was described in Germany by Ratzeburg in 1852 from specimens reared by Bouché from berries of the mountain ash. The rose-seed megastigmus (*M. aculeatus*) has been reared in numbers from both wild and cultivated roses at Ithaca, from wild roses from White Church and Wellsville, N. Y., and Waukegan, Ill., and from material from Durham, N. H. In the collection of the U. S. National Museum there are a series of specimens reared from rose seeds imported from Peking, China. The Douglas fir-seed chalcis (*M. spermotrophus*) while a native of the western United States has been reported only from Europe where it has become a serious pest. The grape-seed chalcis (*Evoxysoma vitis*) which first attracted attention at London, Ontario, in 1868 has been found badly infesting the seeds of wild grapes growing in the vicinity of Ithaca, but examinations made of Concord grapes from Ithaca and Catawbas, Delawares, and Dianas from Lake Keuka, N. Y., have failed to show any infestation. The seed-chalcis of the Virginia creeper (*Prodecatoma phytophaga*) previously noted (E. S. R., 20, p. 1147) badly infests the native Virginia creeper (*Parthenocissus quinquefolia*). The closely related Japanese form (*P. tricuspidata*), commonly planted about buildings and known to gardeners as *Ampelopsis veitchii* seems to be immune. The sumac-seed chalcis (*Eurytoma rhois*) also previously noted (E. S. R., 20, p. 1147) is abundant at Ithaca, and sumac seed infested by larvæ probably belonging to this species have been received from East Lansing, Mich.

Descriptions of the stages so far as known are presented of the species here considered.

Fighting the insect pests and diseases of orchard, field, and garden crops, H. L. Price (*Virginia Sta. Circ. 7, pp. 2–112, figs. 41*).—This is a pocket cir-

cular, in which the insect pests and diseases of orchard, field, and garden crops are described and illustrated. Preventive measures and remedies are considered.

Insects affecting vegetables, C. J. S. BETHUNE (*Ontario Dept. Agr. Bul. 171, pp. 1–36, figs. 47*).—This is a popular account of the more important insect enemies of vegetables, the object being to furnish the grower with a convenient manual for the identification of the ordinary insects which injure the crops and to describe the remedies which experience has proved to be the most effective in each case.

The cranberry situation in Wisconsin as regards insect attack, H. J. FRANKLIN (*Wis. State Cranberry Growers' Assoc. [Proc.], 22 (1909), pp. 30–36*).—This is an address presented before the Wisconsin Cranberry Growers' Association, in which the two most important insects of cranberries in Wisconsin, namely, the fruit worm and fire worm, are considered.

Summary of annual report of field entomologist, G. P. WELDON (*Colorado Sta. Rpt. 1908, pp. 136–138*).—Experiments indicate that "Black Leaf" is an effective remedy for the red spider. At a strength of 1:75 it is reported to kill every aphid touched, but the eggs do not appear to be destroyed at a strength of from 1:65 to 1:70.

Experiments were made to determine the least strength of arsenate of lead that can be used effectively and with the least number of applications. Counts of 15,469 Ben Davis and Jonathan apples showed that, using strengths of 2, 3, and 4½ lbs. per 100 gal., the percentages free from worms were 85 with 2 lbs., 88 with 3 lbs., 95 with 4½ lbs. and two applications, and 97 with 4½ lbs. and three applications. On a check tree (Ben Davis) 70 per cent of the apples were free from worms.

A list of the insect pests found in orchards is included.

Apple spraying in 1908, H. A. GOSSARD (*Ohio Sta. Circ. 95, pp. 8, figs. 8*).—This is a summary of the results obtained from spraying experiments in an apple orchard of 534 trees from 12 to 24 years old on 12 acres located in Sandusky County.

As soon as possible after the blossoms fell the entire orchard was given a heavy spraying of arsenate of lead either alone or combined with Bordeaux mixture. Where arsenate of lead was used alone for the first spraying, a second spraying with Bordeaux or lime-sulphur, or with Bordeaux and the arsenate of lead combined, was given as soon as possible after the first application. Some plats received a third spraying of arsenate of lead alone about July 20.

With the exception of a single plat of Ben Davis no russeting of the fruit could be detected on any of the varieties, no matter how heavily they were sprayed or when the applications were made.

The best record obtained was from a Ben Davis tree sprayed with Bordeaux before bloom and once heavily with arsenate of lead soon after the bloom fell. Of the apples picked from this tree 4,469 were sound and but 8, or 0.17 per cent, wormy, and of the total crop, including drops, 4,833 were sound, and but 15, or 0.31 per cent, wormy. Of the sound apples 5 bbls. were firsts and 0.9 bbl. seconds.

The trees sprayed about 2 weeks after the bloom fell ran from 3 or 4 per cent wormy on some trees to 33 or 34 per cent wormy on others. An unsprayed check plat yielded 42.5 per cent wormy. So far as could be determined the second and third sprayings had so little effect in reducing the percentage of worminess that they did not pay for the cost of application.

"The total income from the orchard for the season was approximately $7,400. It is safe to say that from $5,500 to $6,000 of this return was net and that the average net return per acre was between $400 and $500. From 55 Ben Davis trees, 24 years old, were picked 396 bbls. of apples."

Control of the brown ant (Solenopsis geminata) and the mealy bug (Pseudococcus citri) in pineapple plantations, W. V. Tower (*Porto Rico Sta. Circ. 7, pp. 4*).—This is the Spanish edition of this circular. The English edition has been previously noted (E. S. R., 19, p. 1157).

The fight against phylloxera in Algiers, Trabut (*Bul. Agr. Algérie et Tunisie, 15 (1909), No. 1, pp. 5–21; Rev. Vit., 31 (1909), Nos. 787, pp. 43–47; 788, pp. 65–71*).—This is largely a discussion of the life history and habits of the phylloxera as related to methods for its control. Part of an address upon the problem presented by Grassi at a congress of Italian agriculturists, held in February, 1908, is given. It is considered necessary that a further knowledge be gained of the life history and habits of the pest, particularly as relating to dissemination, in order that its distribution, particularly in Algiers, may be more intelligently guarded against.

[Tests of scale remedies and summer sprays], L. R. Taft and F. A. Wilken (*Michigan Sta. Spec. Bul. 48, pp. 20–24*).—The authors briefly report the results obtained from tests made of several remedies for the San José scale. The Rex lime-sulphur and Niagara brand lime-sulphur solutions gave very similar results, both doing very effective work or about equal to that obtained with the homemade lime-sulphur. Target brand scale destroyer and Cooper's fluid V 1 gave very poor results, neither seeming to have very much effect on the scale. Water-soluble oil gave quite good results, although not so good as those obtained with the lime-sulphur solution. Suggestions are given for the preparation of concentrated homemade mixtures.

Tests were made of several materials as substitutes for the Bordeaux mixture. The Rex and Niagara brands at 1:25, as recommended by the manufacturers, burned the foliage of apples, pears, cherries, and plums. Homemade lime-sulphur made by the 12:15:50 formula and reduced one-fifth that strength for summer use did practically no harm to the foliage. The results from the lime-sulphur tests showed that it had some value as a fungicide, although the foliage on the trees sprayed with it did not appear as healthy or as large as that on trees sprayed with the Bordeaux mixture. The lime-sulphur was of little value as a remedy for the codling moth, 20 per cent of the apples being wormy, as compared with only 6 per cent on trees sprayed with arsenate of lead. A combination of Bordeaux mixture and calcium-benzoate was tested, but the results did not indicate that it would control the scale, and in a general way it was inferior to the regular Bordeaux mixture. Grasselli's Bordeaux paste was found to mix with water about as well as arsenate of lead but did not stay in suspension nearly as well as a properly prepared homemade Bordeaux mixture, and the results were not equal to the homemade Bordeaux mixture and arsenate of lead. The results obtained from Cooper's fluid V 2, which is recommended as a summer spray for fruit trees, were quite unsatisfactory.

Lime-sulphur washes, R. Harcourt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 72–76*).—The author has made analyses of commercial lime-sulphur solutions and finds that some of the manufacturers have overestimated the strength of the preparation and have given directions for a greater dilution than the product will warrant. From analyses made of 4 samples of one particular brand, it was found that when diluted according to directions they contained 113.3, 56.3, 62.6, and 92.4 gm. of combined sulphur per gallon, respectively, as compared with 153.5 (boiled ½ hour) and 161.0 gm. (boiled 1 hour) in homemade wash of the 20:15:40 formula.

Washes were made of 3 different kinds of lime, but it was found that while analyses showed a variation of from 86.4 to 99.4 per cent in the content of

calcium oxid, all these limes produced washes of similar composition. In experiments in adding varying proportions of sulphur to the lime, it was found that it takes longer for the maximum amount of sulphur to go into combination where the higher proportion is used. In experiments made to determine the time necessary for complete combination, 3 brands of lime were used at the rate of 20 lbs. to 15 lbs. of sulphur. With 2 brands the lime combination was practically effected at the end of 40 minutes, while with the third brand 1 hour was required. It was found that direct heat induces a more rapid combination of the lime and sulphur than does steam heat, but gives a wash of slightly lower value.

Flour of sulphur was found to combine somewhat more rapidly and slightly more completely with the lime than does flowers of sulphur and has less tendency to form the less valuable thiosulphate and sulphite. The wash was found to become less valuable when allowed to cool before being applied. The development of a green color in the wash during boiling was found to be due largely to the presence of iron in the lime or to that derived from the vessel in which the boiling was carried on. The length of time it takes for the color to develop depends upon the amount of iron or similar metal which is present.

Fumigation with cyanid of potassium, H. L. Hutt and W. Hunt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 161, 162*).—Experiments in continuation of previous work (E. S. R., 19, p. 1160) with hydrocyanic-acid gas for exterminating the greenhouse white fly (*Aleyrodes vaporariorum*) showed that a comparatively tight house is necessary for effective work. In fumigating the black aphis on chrysanthemum the best results were obtained by placing a jar or vessel of the material at least every 20 ft. throughout the length of the house. The density of the foliage of these plants and the greater vitality of the black aphis as compared with the white fly are factors necessitating stronger fumigation.

Fumigation investigations in California, R. S. Woglum (*U. S. Dept. Agr., Bur. Ent. Bul. 79, pp. 73, figs. 28*).—This is a report of fumigation investigations which were commenced July, 1907, in California with the view of thoroughly standardizing the process.

The author first considers the insect enemies of citrus fruits and their distribution in California. The scale insects which are generally so destructive as to require extended efforts for their control are the purple scale, the red scale (*Chrysomphalus aurantii*), and the black scale. Brief notes are included on other less destructive species. "The most important pests other than scale insects are to be found among the mites, of which the rust mite of the orange or silver mite of the lemon (*Phyllocoptes oleivorus*) and the citrus red spider (*Tetranychus mytilaspidis*) are highly injurious. The orange aphis (*Aphis gossypii*) becomes very numerous during some seasons but is soon attacked by its natural enemies and held in control. A species of thrips [E. S. R., 20, p. 956], worked quite extensively in some localities on ripe oranges during the first months of 1908, removing the coloring matter from beneath the epidermis, thus giving to the fruit a spotted appearance which lowered its market grade."

Trees have been noticed from 2 to 3 years after planting which have been killed by the red scale. Large orchard trees are frequently destroyed by this pest, while it is a common sight in regions of severe infestation to see large branches killed back to the trunk. Although no trees have ever come to the author's attention which were killed by the purple scale, severe infestations are said to result in the destruction of many branches and to cause such a drain on the tree that the production of fruit is greatly reduced. The purple scale spreads to the fruit as does also the red scale, resulting in expense for

the cleaning of fruit or rendering it of a lower grade, and in extreme cases entirely valueless.

The black scale, although a much larger insect than either the red scale or purple scale, appears to have generally little effect on the vitality of the tree. Its commercial importance arises largely from its habit of secreting honeydew, which spreads over the leaves, fruit, and branches, furnishing a growing medium for a black or sooty-mold fungus, resulting in a black coating throughout the tree. This coating is removed from the fruit by washing, or in light attacks by brushing, although the investigations of Powell et al. (E. S. R., 20, p. 43), have shown that the decay is greater in washed than in unwashed fruit. To avoid the washing of fruit it is necessary to destroy the scale in the orchards. The more directly injurious effect to the tree resulting from the attacks of the red, purple, and yellow scales appears to the author to be due to the ability to produce some toxic effect in the host plant in addition to the injury caused by the removal of sap.

The equipment and methods of fumigation, including dosage and dosage tables, methods of computing volume, measurements of trees, etc., are considered at some length. An imported cyanid designated as 98 to 99 per cent pure is reported as used almost exclusively for fumigation purposes in southern California under the popular belief that it is superior to American cyanids for this purpose. There appears, however, to be no real basis for this belief. In procuring sulphuric acid for fumigation purposes only that should be purchased which is entirely free of nitric acid and which is guarantied 66° (Baumé), or 93 per cent pure. The proportions of materials to be used are considered in detail. The use of one part (fluid measure) of acid to each part of cyanid is recommended.

Water should always be used. Practice is said to have demonstrated that with a greater proportion of water the injurious effect of the resulting gas on the leaves and fruit is materially lessened. The lessening of the injury has been attributed to the fact that the escaping gas was less heated when large proportions of water were used. In order to determine the actual action an experiment was conducted in which 1 part of cyanid, 1 part of acid, and from 1 to 8 parts of water were used. It was found that the maximum temperature of the escaping gas is always realized within the first minute, usually 30 to 40 seconds after the generation commences, and an examination of the maximum temperatures of the gas in this experiment indicates that the temperature of the gas is reduced when large proportions of water are used. When using from 1 to 4 parts of water the temperature is nearly uniform, but with 5 parts of water the decrease becomes marked. The violence of the reaction and the temperature of the gas are affected more or less by the size of the pieces of cyanid. A very violent reaction results from the use of cyanid in powdered form. As the proportion of water to sulphuric acid becomes larger the resulting temperature of the mixture is lessened.

Experiments were made to determine the temperature of gas resulting from large and small doses, in which the proportions 1 part cyanid, 1 part acid, and 3 parts water were used. An examination of the results shows that the temperature of the escaping gas increases somewhat as the dosages become larger. The highest temperature of the acid-water mixture occurs about ½ minute after the mixing takes place. The highest temperature of the hydrocyanic-acid gas occurs about ½ minute after the generation commences, and then the temperature of the gas rapidly decreases during 2 to 3½ minutes, at the end of which time most of the gas has been evolved. At the expiration of 3 to 5 minutes the generation of gas has practically ceased,

It is said that in field operations burning results to some extent from increased dosages, due to the heated gas being more injurious than cooler gas. From the experiments conducted it is evident that the largest amount of gas is available when 2 parts of water are used with one each of cyanid and acid. It is said to be impracticable, however, to use 2 parts of water in field work and 3 parts are recommended.

Preliminary experiments for the control of the purple scale are reported. These lead to the conclusion that for normally shaped orange trees from 11 to 14 ft. in height exposed to the gas for 1 hour, when situated in a region with conditions comparable to those at Orange, Cal., a dosage rate of 1½ oz. of cyanid per 100 cu. ft. will destroy the purple scale in all its stages on the leaves and wood. If the tree contain fruit infested with this scale it will be necessary to slightly increase the dosage. The author believes that a period between 50 minutes and 1½ hours, while producing satisfactory results will at the same time be most economical. The cost of the extra cyanid required to kill the eggs on the fruit above that necessary for the destruction of the eggs on the leaves and branches is said to be more than the scaly fruit is worth.

Under the heading of "general considerations," many important points are taken up, including leakage of gas during the operation, time of the year for fumigation, fumigation during the blossoming period and while the fruit is of small size, and other information of value to the fumigator. An improved system of fumigation, which was introduced into California in July, 1908, is described at some length. This is said to have decided advantages over the old method. A dosage schedule is also included.

Parasitic fungi of the white fly, H. S. FAWCETT (*Florida Sta. Rpt. 1908, pp. LXVII–LXXV, pl. 1*).—In addition to the fungi previously noted (E. S. R., 20, p. 556), the cinnamon fungus (*Verticillium heterocladum*) and the white-fringe fungus (*Microcera* sp.) have been found to be parasitic upon the white fly. The cinnamon fungus, which was found on white fly larvæ at Palmetto, was also found to attack several scale insects.

The white-fringe fungus, which was found killing large numbers of white fly larvæ at Sutherland, is now thought to be a species of Fusarium, but until the perfect stage is discovered the name *Microcera* sp. will be retained. The growth of this species in culture is said to have been much more rapid than any of the other white fly fungi. Experiments indicate that the fungus requires favorable conditions of moisture for its growth and that it is probably even more dependent upon moisture than are any of the other white fly fungi.

The work with pure cultures of the red and yellow Aschersonias has been continued and is here briefly reported upon.

Insect pests of cacao, H. A. BALLOU (*Imp. Dept. Agr. West Indies Pamphlet 58, 1909, pp. 26, figs. 12*).—Cacao thrips (*Physopus rubrocincta*) and the cacao beetle (*Steirastoma depressum*) are said to be the insect pests chiefly found in cacao orchards. Aphids, mealy bugs, the akee fringed scale (*Asterolecanium pustulans*), and the root borer of the sugar cane (*Diaprepes abbreviatus*) are also mentioned as pests. Spraying machines and insecticides are briefly considered.

Cryptorhynchus lapathi, J. VANHOUDENHOVE (*Bul. Soc. Cent. Forest. Belg., 16 (1909), No. 1, pp. 24–27*).—Attention is called to the importance of this curculionid, which was not included in the account of the enemies of the willow previously noted (E. S. R., 20, p. 857).

The occurrence of the larvæ of a parasitic fly (Protocalliphora chrysorrhœa) in bird nests in the vicinity of Shawnee, Pa., C. W. MILLER (*Worthington Soc. Study Bird Life Bul. 2, pp. 8, pls. 4*).—The author reports the occurrence in Pennsylvania of the immature stages of this fly in nests of the wood thrush,

robin, bluebird, meadow lark, red-winged blackbird, wren, English sparrow, and catbird. He concludes that the maggots do not rely upon the flesh of living birds for food, but that they live for the most part in the rubbish of nests. Pupæ have been found parasitized by *Nasonia brevicornis*. A description of the fly prepared by D. W. Coquillett is presented.

Bee keeping in Massachusetts, B. N. Gates (*U. S. Dept. Agr., Bur. Ent. Bul. 75, pt. 7, pp. 81–109, figs. 2*).—In this account the author first reviews the history of bee keeping in Massachusetts, which dates from 1644. To-day there are said to be at least 2,100 persons in the State who derive some profit from their bees. The 1,050 bee keepers who reported in the spring count of 1906 had 5,839 colonies, or an average of about 5.5 colonies. There were but three persons who report 75 to 100 colonies in their yards and but two who had more than 100 colonies. The number of amateur bee keepers is reduced through the dropping out of 50 per cent of the beginners during the first 5 years.

"The more important honey sources, as reported by the bee keepers in all parts of the State, are clovers, golden-rod and asters, fruit bloom, basswood, wild raspberry and blackberry, sumac, and locust. Some other plants, such as clethra and huckleberry, are of local importance and some listed as of minor importance are probably underestimated.

"The Italian race in varying degrees of purity is most popular. The German or 'black' still persists, but is rarely found pure.

"Twenty-five per cent of the bee keepers still use box hives to some extent. The presence of box hives is most noticeable in the back country, where modern methods penetrate less rapidly. Of the frame hive types, the one standard for the country, the Langstroth, is most generally used.

"The loss in the winter of 1906–7 was 16 to 17 per cent, which taxed the bee keepers nearly $5,000. By far the majority winter their bees on summer stands, protected in various ways or unprotected. A few take advantage of cellar wintering, but most of those who follow this practice are not especially proficient.

"A thousand colonies or more are annually used in cucumber greenhouses. Since practically all of these colonies are useless after coming out of the houses, there is a constant demand and sale for bees.

"The queen-rearing industry is limited to a few persons and late springs make it difficult to compete with southern producers.

"The chief enemy reported is the bee moth. There is great doubt, however, if the damage attributed is really and primarily due to it. There is, on the other hand, sufficient reason to believe that disease is primary and that destruction by the moth is secondary. Gipsy and brown-tail moths are also reported as interfering severely with apiculture in the eastern part of the State."

A list of the more important articles on bee keeping in Massachusetts is appended.

FOODS—HUMAN NUTRITION.

Wheat and flour testing, R. Harcourt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 79–87*).—Tests were made of the baking qualities of a number of varieties of winter wheats grown on the college experimental plats. The general plan included 3 tests with each variety.

The better quality of loaf noted with many of the samples in the second baking is, according to the author, attributable to the improvement of the flour on storage for the 6 months which had elapsed between the 2 tests. "Taking the third baking as a basis of comparison, the largest loaf was got with Crimean Red, which had a volume of 124.1 as compared with the standard

at 100 and an average quality of bread of 104. Buda Pesth had a volume of 116.2 and an average quality of bread of 104.6, while Red Wave had a volume of only 91.0 and an average quality of 97.3."

"The ideal wheat is a heavy yielding variety having good milling and baking characteristics. Yield naturally commands the first attention, but we can not get away from the fact that the wheat is grown to be converted into flour which must have the necessary strength to produce a good loaf of bread."

According to the author, there appears to be some relationship between yield per acre, weight per measured bushel, and quality of flour as indicated by size and quality of the loaf of bread it will produce.

The following table summarizes the experimental data from this standpoint:

Yield and weight of wheat, and quality of flour compared.

Number of samples.	Average yield per acre.	Average weight per measured bushel.	Average size of loaf.	Average quality of loaf.
	Bushels.	*Pounds.*	*Per cent.*	*Per cent.*
10 samples yielding above 60 bushels per acre	63.84	61.78	97.3	98.5
30 samples yielding between 45 and 60 bushels per acre	49.27	62.05	104.4	100.2
23 samples yielding below 45 bushels per acre	40.52	62.19	105.3	100.3

"The above table shows that, taking the average of the results obtained for the individual wheats and flours, as the yield of wheat per acre decreased, the weight per measured bushel and the size and quality of the loaf the flour was capable of producing, increased.

"This statement, however, can not be applied to individual cases, for there are two or three of the very poorest bread making wheats in the last or lowest yielding group."

Report of experiments with six different flours, to determine whether strong wheat or soft wheat flour is best for milk biscuits made with baking powder, MARY U. WATSON (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 242–247*).—Strong flours, soft flours, and a blend of two sorts were compared. The ingredients in making biscuits were weighed, oven temperatures and losses in weight were recorded, and an attempt was made to keep experimental conditions uniform. The general conclusions follow:

"Other things being equal, soft wheat flours make tenderer milk biscuits than strong wheat flour.

"Given a strong wheat flour dough and a soft wheat flour dough of equal slackness and suitable for milk biscuits, the soft wheat flour dough is the easier to handle.

"At the present prices of the different flours the strong wheat flour biscuits cost more than soft wheat flour biscuits.

"It is possible that a larger proportion of fat used with the strong wheat flour would yield biscuits of tenderness equal to those of soft wheat flour, but the cost of fat makes that method of improvement a disadvantage."

Milling and baking tests, C. E. SAUNDERS (*Canada Expt. Farms Rpts. 1907, pp. 219–223*).—Milling and baking tests with spring wheat, durum wheat, and winter wheat previously reported (E. S. R., 19, p. 861), are summarized and additional data are given regarding the effects of storage on wheat and flour.

According to the author, "the amount of improvement both in strength and in color varies very much in the cases cited. In a few of the other flours studied, little or no change could be found. . . . From the work already done on this

subject it appears that the gain in baking strength is more rapid when the material is stored as flour than when stored as wheat; but the change takes place in both cases and seems to reach the same limit in the end. . . .

"It is to be hoped that before long the increased value of wheat which has been stored for a considerable time will be more fully recognized, and that such wheat will be sold at the enhanced price warranted by the increased strength and improved color of the flour which it will yield."

Poulard wheat and its value for bread making, A. LOLLI (*Staz. Sper. Agr. Ital., 41 (1908), No. 9–11, pp. 609–636*).—Analytical studies and bread making tests are reported and general data summarized in this report on the value of poulard wheat, *Triticum turgidum*. The general conclusions were not favorable to the use of this wheat for bread making purposes.

Differences in flour grades and the cause, G. L. TELLER (*Oper. Miller, 14 (1909), No. 6, pp. 301, 302, fig. 1*).—A discussion of analytical and other data. The author's conclusions are favorable to the bleaching of flour.

The sugar content of fine white flour dough before and after fermentation and the diastasic value of white flour, H. J. VON LIEBIG (*Landw. Jahrb., 38 (1909), No. 2, pp. 251–271*).—According to the conclusions drawn by the author from experimental data reported, the sugar present in white flour is glucose and saccharose, the proportions on a dry matter basis being 0.1 to 0.4 per cent and 1 to 1.5 per cent, respectively.

When flour is mixed with water, and also when it is made into dough, maltose is formed through the agency of a diastasic ferment. The fermentation of sugar in dough proceeds very rapidly, and under favorable conditions of time and temperature may amount to a number of per cent. For instance, when dough was kept at 30 to 40° C. for 14 hours, 4.6 per cent of reducing sugar estimated as glucose was found, the glucose content of the original flour being only 0.15 per cent. The proportion of saccharose in the dough, on the other hand, showed only small variations and remained practically unchanged by direct extraction of the flour with water. When dough made in the usual way with yeast, water, and salt was allowed to remain for 2 hours at a temperature of 30° the loss in sugar was found to vary from 1.42 to 2.05 per cent, the loss of reducing sugar being much greater than that of saccharose. Owing to the presence of the diastase in white flour, a small amount of unfermented sugar could be detected in the dough after 2 hours.

Estimated according to Lintner's method, the diastasic value of coarse, dark flour was one-third, and that of fine white flour one-seventh, that of normal malt used for comparison. These values are, of course, relative and only comparable with data obtained in tests with dissolved starch. As is well known, extracts of all unsprouted grains contain a diastase which, like that of malt, hydrolizes starch solution, often in considerable quantity but possessing only in small degree the power of dissolving and hydrolizing starch grains. It is probably a weak diastase of this character, a so-called trans-location diastase, which is present in dough made from flour.

A new type of peasant bread, P. GIBELLI and E. GRÜNER (*Ann. Ist. Agr. [Milan], 7 (1905–6), pp. 95–106*).—It is claimed that the form of wheat bread described possesses special advantages. An analysis is reported in comparison with corn bread.

Table sirups, A. MCGILL (*Lab. Inland Rev. Dept. Canada Bul. 177, pp. 13*).—Data are given regarding the examination of 75 samples collected in different regions in Canada. Of these, 39 consisted essentially of cornstarch glucose, with varying amounts of cane sugar; 23 were essentially cane sugar sirups, although several of them contained notable amounts of glucose; while the remaining 13 samples contained usually as much as 30 per cent cane sugar.

"Mixed sirups, consisting of glucose sirup and true sirup, may be perfectly wholesome foods; as, indeed, may be true of glucose per se. But, in order to be perfectly honest articles of commerce, the fact of their composition should be made known to the purchaser.

"The differences in taste and flavor between a true sirup and a glucose sirup, or a sirup made by mixing glucose with a true sirup, are quite well marked; and it may be urged that, so long as the purchaser finds no fault on the ground of sweetness, flavor, and other qualities that appeal to the sense of taste, there is really no ground of complaint, even should he be supplied indiscriminately with one or other of these articles. The nutritive properties (energy producing power) possessed by them may, so far as we know, be considered identical. . . . [Doubtless] there are many consumers who distinguish between cane sirup and glucose sirup; and in the interest of such consumers, as well as for the purpose of making a clear statement of fact, . . . [it seems] that table sirups should be sold under distinctive names, as for example, maple sirup, cane sirup, glucose sirup, mixed sirup, etc."

The occurrence of oïdium fungi on preserved fruits, Kühl (*Pharm. Zentralhalle, 50 (1909), No. 16, pp. 317, 318*).—The author studied the growth of this sort of mold under a variety of conditions, especially with reference to its growth on food products. He does not believe it should be regarded as harmless.

Cashew nuts as a substitute for walnuts or almonds, W. Theopold (*Pharm. Zentralhalle, 49 (1908), No. 52, pp. 1057, 1058; abs. in Chem. Zentbl., 1909, I, No. 6, pp. 455, 456*).—According to the author's analysis, cashews differ from walnuts and almonds in the presence of starch and in the iodin value of the fat. It is stated that cashew nuts are used in place of walnuts and almonds in making chocolate goods.

Baking powders, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 174, pp. 27*).—Of 158 samples of baking powders, 60 were cream of tartar, 84 alum phosphate, and 14 alum powders. The author discusses the keeping quality of baking powders, efficiency of different types as gas producers, and other questions, and reports determinations of the available, total, and residual gas, and of the excess of bicarbonate of soda in the different brands of powders.

The average amounts of available carbon dioxid in the different brands of cream of tartar powders was from 7.88 to 13.68 per cent, in the alum powders from 9.55 to 11.27 per cent, in the alum phosphate powders 7.44 to 11.13 per cent, and in a cream of tartar-alum powder, 16.84 per cent. In the author's opinion, a minimum limit of 10 per cent of available gas would be quite reasonable, and he believes that there is no necessity for having on the market any baking powder with less than this quantity.

"When the reaction between the bicarbonate of soda and the acid present in the powder is completed, the further addition of acid will cause the evolution of more carbon-dioxid gas, provided that an excess of bicarbonate of soda is present in the powder. The amount of such gas evolved affords a measure of the excess of bicarbonate in the powder. It must be understood that this additional gas, while available to the analyst in the laboratory, is not available to the cook, in ordinary baking operations. . . . [Such gas is termed 'residual carbon dioxid' and the quantity] should be small, in a carefully prepared powder.

"The starch component in a baking powder is of no importance, except so far as the presence of a high percentage of starch necessitates a lowered percentage of the active components. On account of its high acidity burnt alum permits the use of a high starch percentage, and it is no unusual thing to find from 45 to 50 per cent of starch in alum powders. Alum phosphate powders

usually contain from 35 to 45 per cent of starch. As already shown, a good cream of tartar powder can not contain much above 20 per cent of starch. This may, however, be considerably increased without lowering the efficiency of the powder, if free tartaric acid is made to take the place of an equal weight of cream of tartar.

"Sulphate of lime (terra alba) is an undesirable filler. It is usually present in phosphate powders, as the acid phosphate of lime is manufactured by treatment of the neutral phosphate with sulphuric acid, leaving in the product an equivalent weight of sulphate of lime. Less objection can be taken to this modicum of sulphate of lime than to the addition of terra alba, as such, to the baking powder. While having no positively harmful effect, terra alba has the objectionable qualities of great insolubility and total lack of food value.

"It is sometimes claimed for it that being less hygroscopic than starch, it makes a better filler, enabling the powder to be kept longer without deterioration. . . . [Probably] the majority of consumers would prefer some form of starch, and with reason."

Ground cloves, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 173, pp. 19*).—Of 142 samples of ground cloves analyzed 74 were found to be genuine.

Mustard, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 176, pp. 11*).—A considerable number of samples of mustard were examined with a view to the detection of adulteration.

"The question of the amount of added matters which may be permitted is serious, from the point of view of the use of mustard as a domestic remedy, in blisters, poultices, emetics, etc. The mustard of the pharmacopœias permits of no admixture. Mustard as a condiment is another matter, and the public should learn to recognize the distinction between the two. Condimental mustard may be regarded as a substitute, in emergency, for the pharmacopœial mustard, but by no means to be confused with this last."

Studies on cider and perry. I, Sulphite preservatives, H. E. Durham (*Jour. Hyg. [Cambridge], 9 (1909), No. 1, pp. 17–32*).—According to the author's conclusions, further and more precise regulation is needed in Great Britain at an early date regarding the use of preservatives in food.

"The addition of sulphurous acid and sulphites to cider and perry needs regulation.

"The permissible limit of addition of the substances should be expressed as 'total sulphur dioxid' obtained by distillation with phosphoric acid.

"Judging from the practice of some makers, the addition of sulphites or other preservative is unnecessary, and from that of other makers whose products only contain relatively small proportions, the maximum legal limit of 'total sulphur dioxid' should be low; and at any rate not exceed 100 mg. per liter."

Analytical studies of wine from the province of Caltanissetta, F. Carpentieri (*Staz. Sper. Agr. Ital., 42 (1909), No. 3, pp. 161–178*).—Analyses are reported and discussed.

Roman wine. Vintage of 1907, F. Maggiacomo and G. Corso (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 361–368*).—A number of analyses of Roman wines are reported.

Boric acid in genuine Sicilian wines, E. Azzarello (*Gior. Sci. Nat. ed. Econ. [Palermo], 26 (1908), pp. 2–21*).—Boric acid occurs normally in Sicilian wines, according to the author's investigations, the amount being dependent upon the character of the soil.

The dead meat trade (*Dept. Agr. and Tech. Instr. Ireland Jour., 9 (1909), No. 3, pp. 415–424, pls. 8*).—In view of the possibility of developing in Ireland a dressed meat industry similar to that carried on between the North of Scotland

and London, an investigation was made of the conditions under which the business is carried on. The question of the amount of capital involved, the transportation of the meat, market classification, and similar topics are discussed.

Meat trade in Paris in 1907, G. Cadoux (*Jour. Soc. Statis. Paris, 49 (1908), No. 10, pp. 342–344*).—A summary of statistical data.

Concerning the fat of hens' eggs, R. Paladino (*Biochem. Ztschr., 17 (1909), No. 4, pp. 356–360*).—According to the author's summary, the fat of egg yolk consists of a mixture of a liquid and a solid, the solid fat, which is of a light yellow color, being present in greater quantity. The liquid fat is oily and of a dark orange color. In both fats oleic, palmitic, and stearic acids are present, as well as considerable quantities of phosphoric acid together with iron and sulphur. Volatile acids were not present. Data regarding spectroscopic behavior are also given. It was possible to obtain lipochrom in these fats in characteristic yellow crystalline needles.

Studies of the lecithin of egg yolk, H. MacLean (*Ztschr. Physiol. Chem., 59 (1909), No. 3–4, pp. 223–229*).—The author's conclusion is that the total nitrogen of the lecithin is to be regarded as nitrogen of cholin and compounds, as yet unknown, derived by cleavage from the cholin molecule.

Concerning crab extract, H. Barschall (*Arb. K. Gsndhtsamt., 30 (1909), No. 1, pp. 74–76; abs. in Ztschr. Angew. Chem., 22 (1909), No. 16, p. 741*).—Studies of the amount and distribution of the nitrogen are reported. Creatin and creatinin were not found.

The effect of cooking on cellulose, Edna D. Day (*Jour. Home Econ., 1 (1909), No. 2, p. 177*).—It is commonly stated that the cell walls are ruptured when potatoes are boiled or baked, but the author states that such a condition has not been observed in the numerous investigations which she has made. When cells from cooked potatoes were examined it was found that the middle lamella which holds the cells together had dissolved and that the cells had separated from each other, but the cell walls were not ruptured. "If, however, saliva is added to these unbroken cells, the starch filling them is very quickly digested, as shown by the fact that they no longer give the blue color with iodin, proving that the breaking of the cell wall is not at all essential for ease of digestion."

The fireless cookbook, Margaret J. Mitchell (*New York, 1909, pp. XII+315, figs. 18*).—As the author states in the preface, "the aim of this book is to present in a convenient form such directions for making and using fireless cookers and similar insulating boxes, that those who are not experienced, even in the ordinary methods of cookery, may be able to follow them easily and with success."

The early chapters give directions for making and using fireless cookers, methods of measuring food materials, tables for ready reference, and a large number of recipes, some of them original, especially adapted to the method of cookery under consideration. In most cases the number of persons the dish will serve is stated.

The chapter on institution cookery discusses the problem with special reference to the needs of small institutions, boarding house keepers, lunch room managers, and others whom the author believes might benefit in the saving of labor and expense if fireless cookers were introduced. For such cases recipes using large quantities are given. The appendix describes or suggests a series of experiments specially planned for students of household economics and illustrating the scientific as well as the practical side of the fireless cooker.

The author also gives detailed directions for the making of homemade cookers for boiling and steaming food, insulated ovens for baking, insulated boxes for keeping foods cold, and similar devices. Economy of fuel, labor, and expense

is claimed for the cooking devices and economy of ice for those designed for the storage of cold foods.

The country cooking school, C. BARNARD (*Housekeeping Expt. Sta. [Conn.] Bul. 5, pp. 4*).—The need for instruction in cookery in rural schools is insisted upon. The author believes that such instruction is greatly facilitated by the use of stoves which burn denatured alcohol in gaseous form. The subject of such fuel in relation to rural instruction and cookery is considered at length.

Food for the farm family, FLORA ROSE (*Cornell Countryman, 6 (1909), No. 5, pp. 137–139*).—In this general discussion of the subject the author considers the requirements of the diet and urges the importance of knowledge and intelligence on the part of individual housekeepers.

Studies of the condition of Lombardy peasants, E. GRÜNER (*Ann. Ist. Agr. [Milan], 7 (1905–6), pp. 4–33, pls. 2*).—Housing, hygienic conditions, incomes and expenditures, character of the food, and similar questions are discussed in continuation of earlier work (E. S. R., 18, p. 1066). The report includes analyses of corn meal, bread, polenta, and other typical foods.

Diet in the Philippines, C. F. LANGWORTHY (*Jour. Home Econ., 1 (1909), No. 2, pp. 171–173*).—Some data collected from a variety of sources are summarized and discussed. The ration allowance of the ordinary Filipino laborer, according to the calculations made, would supply 70 gm. protein and 2,340 calories per day on the basis of 120 lbs. body weight, or 88 gm. protein and 2,925 calories on the basis of 150 lbs.

Social life in the Philippines, A. BROWN and P. WHITMARSH (*Cooking Club Mag., 11 (1909), Nos. 4, pp. 291–298, pls. 2, figs. 6; 5, pp. 395–401, figs. 5*).—In this discussion of the living conditions of natives in the Philippines information regarding food supply and preparation and other similar questions is summarized.

Food products in China, A. P. WILDER (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3487, pp. 14–16*).—In a discussion of Chinese conditions with reference to the possibilities for American trade in starches, sirups, corn products, etc., some general information is given regarding food habits and similar topics.

"The dietary of the natives in southern China is limited. It carries vegetables and 'green stuff,' some pork, and salted eggs, but sifts down to rice and fish as the substantials. When times are bad the sweet potato is even substituted for the rice. Cornstarch, so much in use . . . [in the United States] for blanc manges and thickenings for gravies, etc., is not in demand, as the natives use for such purposes the water in which they have boiled their rice—congee water. This liquid when cold sets into a thick, viscous, and transparent jelly which is colored, sweetened, and eaten as we eat blanc mange. . . .

"The use of flour is being extended. It is worked up into cakes."

Recent development of industries and natural resources [in Japan], E. G. BABBITT (*Mo. Cons. and Trade Rpts. [U. S.], 1909, No. 344, pp. 213–222*).—In this discussion of the industrial situation, labor, and related matters in Japan information is given regarding changes in food habits, wages, and living expenses. It is pointed out that there has been a gradual increase in wages and a corresponding increase in the cost of living.

"Bread, meat, and potatoes have been added to the former diet of the Japanese, which consisted of fish and the vegetables indigenous to the country. The men at the front during the Russo-Japanese war were often fed on beef and bread or biscuits made from American flour, and this created a taste or appetite which had to be catered to on their return, and other articles followed, so that during and after the war there was considerable increase in the use of meats and flour, canned goods, fresh and condensed milk, butter, and foreign foods generally.

"There were a great number of farm hands in the Japanese army during the war, and the use of meat and other unusual articles of diet led to the increased demand for these commodities on the return of these men from the front. This change is felt less, however, among the farm hands than among any other classes, although more potatoes and bread are consumed by this class than was the case with them prior to the war with Russia."

Report of Committee on Social Betterment, G. M. KOBER (*Reports of the President's Homes Commission. Washington, D. C., 1908, [pt. 5], pp. 281, pls. 4; Reprint, pp. 281, pls. 4*).—The Report of the Committee on Social Betterment, which forms one of the reports of the Homes Commission appointed by President Roosevelt to study housing, sanitation, and social betterment in the District of Columbia, includes sections on such topics as Industrial and Personal Hygiene, Alimentation and Foods (noted below), The Causes and Prevention of Infectious Diseases, Infantile Mortality, The Prevention of Permanent Disabilities in Childhood, and The Scale of Wages and the Cost of Living, by the author of the report, papers on Good Food at Reasonable Cost (noted below), by C. F. Langworthy, Food and Home Betterment (noted below), by G. M. Kober and Emma M. Cross, Sociological Study of 1,251 Families, by G. H. Weber, The Business Relations of Wage-Earners, by J. B. Reynolds, and How to Benefit the Poor in the Slums, by W. F. Downey.

The Sociological Study of 1,251 Families includes a summary and discussion of living conditions, income and expenditures, occupations, hours of labor, employment, and similar topics. Inquiries concerning the noon-day meals of wage-earners brought out the information that in 678 cases they were compelled to eat cold food, 750 carried dinner pails, and 205 "were reported as being accustomed to consume alcoholic beverages with their meals. The number in each case was greater among the white than among the colored wage-earners."

As a whole the Report of the Committee on Social Betterment is a very valuable document not only for the information which it provides regarding conditions in the District of Columbia, but also for the general discussions of social conditions and for the suggestions made for bettering existing conditions.

Alimentation and foods (*U. S. Senate, 60th Cong., 2. Session, Doc. 644, pp. 121–157*).—This discussion of food problems with special reference to the need of wage-earners' families and the providing of a palatable, wholesome, and adequate diet at reasonable cost forms a part of the Homes Commission Report (see above), and includes three papers. The first, Alimentation and Foods, by G. M. Kober, is general in its nature and discusses the principles of nutrition, the composition of food, and similar topics. The second, Good Food at Reasonable Cost, is by C. F. Langworthy, and the third, Food and Home Betterment, is by G. M. Kober and Emma M. Cross.

The second paper discusses the general principles of nutrition especially with reference to families of moderate income, gives in tabular form the approximate weight and nutritive value of an average portion of a number of common foods, and explains the use of such data in calculating the food value of a meal and a day's ration.

In the introduction to the third paper it is stated that sociological studies made with some 1,200 workingmen's families showed that 476 families with an income of $500 or less expended 43.68 per cent of their annual income for food; 153 families with an income of from $500 to $600 expended 43.59 per cent; 153 families with an income of from $600 to $700 expended 41.40 per cent; and 153 families with an income of from $700 to $800 expended 40.21 per cent.

With a view to improving the diet of such families with respect to cost, nutritive value, and palatability, typical menus are suggested for winter and

summer use and a large number of recipes given of inexpensive dishes from which such menus may be made up.

Golden rules of dietetics, A. L. BENEDICT (*St. Louis, 1908, pp. 407*).—In this volume the author has summarized and discussed data on physiological chemistry with special reference to nutrition, food requirements of the human body, dietary standards, quantitative estimation of food, cookery, the importance of the different food constituents, and other general data, and also presents chapters on infant feeding and diet in relation to various diseases. The volume is designed particularly for the use of medical practitioners.

Linnæus' lectures on diet, A. O. LINDFORS (*Uppsala Univ. Aarsskr. 1907, Linnéfest Skr. 2, pp. 249*).—This translation was made from Linnæus' original material.

Concerning the physiological protein minimum, L. MICHAUD (*Ztschr. Physiol. Chem., 59 (1909), No. 5–6, pp. 405–491, pl. 1*).—The results of an extended series of tests with dogs are reported in which different kinds of protein were studied with reference to the determination of the minimum amount required for physiological processes.

According to the author's summary, failure to maintain nitrogen equilibrium in former experiments with a quantity of protein equal to that excreted after long continued fasting is due, apart from resorption and circulation in the body, principally to the character of the proteid molecule. It must be assumed that when proteids are supplied the body selects those proteid cleavage products which are needed for the regeneration of body substance and rejects those not fitting for this purpose. The latter constitute the proteid material in excess of that essential for attaining nitrogen equilibrium.

In harmony with this theory it was found in the experiments reported that it was not possible to attain nitrogen equilibrium when the plant proteids, gliadin and edestin, dissimilar in character to the body proteids, were supplied in an amount equal to the minimum excretion in fasting. On the other hand, nitrogen equilibrium was attained with such a quantity when the proteid selected was of the same character as the body proteid; that is, in the case of dogs with dog muscle, dog blood serum, or best of all, with a ground mixture of the internal organs of a dog. In the last case apparently the selective function of the body is done away with or reduced to a minimum. The greater the difference between the proteid supply and the body proteid, the greater the difficulty of attaining nitrogen equilibrium. The lack of extractives in plant proteids in comparison with animal proteids apparently did not exercise any marked effect.

In fasting experiments a long fasting period is required to attain the minimum nitrogen excretion. If fasting periods and periods with food are alternated, it is possible to diminish nitrogen excretion to a small quantity, namely, 0.1 gm. per kilogram body weight.

Protein consumption in the animal body, C. A. PEKELHARING (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), No. 8, pp. 289–310*).—In this address, delivered in Amsterdam, the author presents a digest and discussion of data on the metabolism and utilization of protein in the body.

The influence of nitrogen-free energy-yielding substances upon the rate of protein cleavage, W. FALTA and A. GIGON (*Biochem. Ztschr., 13 (1908), No. 3–4, pp. 267–273*).—According to the results of the authors' investigations, the composition of standard diets may have a marked effect upon the rate of cleavage of the supplementary ration in the body in experimental work.

The action of the most important digestive glands, the glands of the stomach and the pancreas, on fish and meat diets, W. N. BOLDYREFF (*Arch.*

Verdauungskrank., 15 (1909), No. 1, pp. 1–25; abs. in Chem. Abs., 3 (1909), No. 11, p. 1294).—After sham feeding of meat more gastric juice is secreted and the secretion continues for a longer time than in a similar case with fish containing the same amount of nitrogen and water. The secretion of both gastric juice and saliva is diminished after repeated feedings of the same material. Fish bouillon was found to be a more active stimulant of gastric secretion than an equivalent quantity of meat bouillon introduced directly into the stomach through a fistula.

Nutrition (*Carnegie Inst. Washington Year Book, 6 (1907), pp. 200–205; 7 (1908), pp. 209–212*).—Information is given concerning grants which have been made to R. H. Chittenden, L. B. Mendel, and T. B. Osborne for studying respectively the minimal proteid requirements of high proteid animals, the physiology of growth especially in its chemical processes, and the vegetable proteids.

Nutrition laboratory, F. G. BENEDICT (*Carnegie Inst. Washington Year Book, 6 (1907), pp. 130–133*).—Plans for the work of the nutrition laboratory are discussed and a progress report is made of the year's research work, particularly that with the respiration calorimeter.

In the respiration calorimeter experiments concerning the specific effect upon metabolism of the ingestion of food it was found that it was possible "to determine with considerable accuracy the effect of the ingestion of varying amounts of nutrients upon body weight and temperature, pulse and respiration rate, the elimination of carbon dioxid and water vapor, the consumption of oxygen, and the heat production, and thus throw important light on the question of the work of digestion."

The experiments are still in progress and the results of those which have been made have not been wholly computed; detailed discussion, the author therefore considers, would be premature. It may be said, however, "that the ingestion of food of any kind results in an increased metabolism as shown by the measurements of the factors mentioned above. Marked differences in the effect of the ingestion of protein, fat, or carbohydrate are also noted.

"The nature of the increase in metabolic activity is not yet wholly clear. Probably all the various factors, such as increased motility of the digestive tract, glandular activity in secreting digestive juices, the chemical action of ferments in inducing hydrolysis, etc., contribute to the total effect. Certainly innumerable problems of vital interest to the physiologist as well as the physician await study."

Nutrition laboratory, F. G. BENEDICT (*Carnegie Inst. Washington Year Book, 7 (1908), pp. 158–162, pl. 1, dgms. 4*).—A description, with plans of each of the four floors, is given of the nutrition laboratory which has been built under the author's direction in Boston, Mass., for the nutrition investigations of the institution. The building is very completely equipped in every way and contains besides the calorimeter laboratory with the respiration calorimeters and accessory apparatus, a special suite of rooms with facilities for experiments on animals, photographic room, machine shop, etc., and quarters for the editorial and computing division.

ANIMAL PRODUCTION.

The rôle of the ash constituents of wheat bran in the metabolism of herbivora, E. B. HART, E. V. MCCOLLUM, and G. C. HUMPHREY (*Amer. Jour. Physiol., 24 (1909), No. 1, pp. 86–103*).—The authors report a study in continuation of earlier work (E. S. R., 21, p. 69), as to the action of the com-

ponents of the phytin complex when administered separately as salts, their channels of excretion and general relation to the phenomena of constipation and diuresis, and the consequent effect on milk secretion.

The animal selected was a vigorous Holstein cow with a keen appetite. The ration, consisting of oat straw, wheat bran, rice, and wheat gluten, had a high phytin content, but a ration low in phytin was secured by extracting the bran with water. The observations were continued for 3½ months.

A change in the phytin content caused no significant fluctuation in the volume or in the composition of the milk. The flow of urine was increased by phytin and certain of its components, as potassium and magnesium as sulphates and chlorids, or by potassium alone as chlorid or phytate.

The nitrogen and phosphorus excretion appeared to have no close direct relation to each other. This was equally true in respect to potassium and magnesium, which rose and fell in the amounts excreted with great regularity and depended on the amount injected. The principal channel for the excretion of phosphorus and magnesium was through the intestinal tract. Potassium and calcium were eliminated by both the urinary and intestinal tracts.

"The constipating effect incidental to withdrawal of phytin was always manifest. When, however, the phytin was replaced with magnesium sulphate, a laxative effect was produced, but when this substitution was made with potassium sulphate or chlorid, an unmistakable dryness of the feces resulted.

"The lime supply in the ration of the entire period was manifestly deficient. The output was approximately 50 gm. daily, while the intake was but 25 gm. The popular notion that wheat bran is particularly useful as a building material for growing animals, due to high ash content, needs qualification. It is high in total ash but its content of lime is relatively low. Ten pounds of wheat bran supplied but 8 gm. of calcium oxid." This deficiency in calcium must have been supplied by the skeleton. "This supports what our experiments with pigs have shown, namely, that the skeletal tissue can vary its ash content within quite wide limits, thereby acting as a supply house over considerable periods of time for certain ash constituents that may be deficient in quantity in the food."

Our present knowledge of the nutritive action of nonproteid nitrogen in feeds, J. Volhard (*Zentbl. Gesam. Physiol. u. Path. Stoffwechsels, n. ser., 4 (1909), Nos. 5, pp. 161–172; 6, pp. 216–220*).—A digest of recent experimental work with birds and mammals.

Concentrated commercial feeding stuffs, J. D. Turner and H. D. Spears (*Kentucky Sta. Bul. 141, pp. 91–204*).—Over 1,100 samples of feeding stuffs were collected and analyzed, including alfalfa meal, wheat and corn products, cotton and linseed meals, malt sprouts, distillers' and brewers' grains, and molasses, poultry, mixed, and proprietary feeds. Analyses are also reported of hay and forage crops.

[Analyses of] fodders and feeding stuffs, F. T. Shutt (*Canada Expt. Farms Rpts. 1907, pp. 152–159*).—Analyses made during the year included corn, wheat, and oat products, molasses feeds, paddy, linseed meal, distillery slop, flax refuse and screenings, cotton-seed meal, and proprietary feeds.

[Analyses of cattle feeds], R. Harcourt (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 68–71*).—Analyses made of 27 samples of frozen wheat indicated that it was but little inferior to normal wheat in feeding value. Other feeds analyzed were wheat and wheat products, rice and rice products, oat and oat products, barley, cotton-seed meal and hulls, gluten meal, soy beans, mixed feeds, and weed seeds.

Cotton-seed meal in its relation to animal industries in the South, A. M. Soule (*Nat. Provisioner, 40 (1909), No. 21, pp. 54I–54L; Oil, Paint and Drug*

Reporter, 75 (1909), No. 21, pp. 280–289).—This is an address before the Interstate Cotton-Seed Crushers Association, noted on p. 307 of this issue.

Experiments at the State stations are cited to show the value of cotton-seed meal as a feed and as a fertilizer, and statistics are given to show the loss to the cotton-producing States by not retaining the entire product at home. An additional waste has also resulted because only two-thirds of the seed is sent to the crushers, this causing a loss in 1907 of oil estimated at $37,235,970. It is suggested that the cotton-seed crushers should cooperate with the growers in reducing this loss and that they organize breeding associations to encourage southern farmers to keep better grades of stock.

The utilization of straw for feeding purposes after the method of Lehmann, B. BAURIEDL **and O.** FALLADA (*Mitt. Chem. Tech. Vers. Stat. Cent. Ver. Rübenz. Indus. Österr.-Ungar., No. 204, pp. 14–32*).—This article describes methods of steaming, treating with caustic soda, and other methods of so utilizing waste straw as to increase the coefficient of digestibility.

The preparation of molasses feeds from beet stalks according to the method of Rosam, O. FALLADA (*Mitt. Chem. Tech. Vers. Stat. Cent. Ver. Rübenz. Indus. Österr.-Ungar., No. 203, pp. 10–13*).—The method of mixing and utilizing these two by-products (E. S. R., 16, p. 585) is described.

The use of saccharin feeding stuffs, KELLNER (*Arb. Deut. Landw. Gesell., 1909, No. 152, pp. 72*).—This is a digest of feeding experiments with molasses, molasses chips, beet molasses, sugar, sugar beets, sugar chips, and numerous commercial mixtures of sugar and molasses with other substances. About one-half of the work is a summary of the findings of German investigators; the other half reports the replies of practical farmers in answer to questions concerning their experience in feeding saccharin mixtures to different kinds of live stock.

[Feeding experiments], J. H. GRISDALE (*Canada Expt. Farms Rpts. 1907, pp. 64–77*).—In experiments in feeding frozen wheat to steers 4 lots of 8 steers each were fed for 70 days. The roughage consisted of silage, roots, oat straw, clover, and oat hay. The lot fed a grain ration of frozen wheat and crushed oats, in the ratio of 2.5 : 2, made an average daily gain of 2.15 lbs. per head at a cost of 6.31 cts. per pound. The lot fed frozen wheat and bran, 2.78 : 2.66, made an average daily gain per head of 2.07 lbs. at a cost of 6.28 cts. per pound. The lot fed gluten and bran, 2.5 : 3.17, made an average daily gain per head of 2.71 lbs. at a cost of 5.33 cts. per pound. The lot fed frozen wheat and bran, 2.2 : 3.3, made an average daily gain per head of 2.4 lbs. at a cost of 5.5 cts. per pound.

In baby beef experiments 6 calves dropped in 1906 and finished in May, 1908, were fed a limited growing ration. During 731 days they made an average daily gain of 1.29 lbs. per head at a cost of 4.88 cts. per pound. Another lot fed a full fattening ration made in 627 days an average daily gain per head of 1.49 lbs. at a cost of 4.63 cts. per pound.

An experiment was also made in feeding frozen wheat to pigs for a period of 56 days. The following were the average daily gains per head: On frozen wheat and shorts, in the ratio 2 : 1, 0.76 lb. at a cost of 4.3 cts. per pound; on frozen wheat and corn, 2 : 1, 1.03 lbs. at a cost of 4.5 cts. per pound for one lot, and 0.94 lb. at a cost of 5.6 cts. per pound for another; on frozen wheat alone, 0.94 lb. at a cost of 3.6 cts. per pound for one lot and 0.86 lb. at a cost of 4.3 cts. per pound for another; on frozen wheat and barley, 2 : 1, 0.81 lb. at a cost of 4.3 cts. per pound; on frozen wheat and oats, 2 : 1, 0.83 lb. at a cost of 4.7 cts. per pound; on frozen wheat and skim milk, 0.86 lb. at a cost of 3.8 cts. per pound; and on shorts, corn, flour, and skim milk, 0.92 lb. at a cost of 4.8 cts. per pound.

[Feeding experiments], W. P. Gamble and G. E. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 88–93, 142–149, figs. 4*).—Digestion experiments are reported with oat dust, barley dust, corn, and wheat bran, using two steers.

The oat dust was fed 5 days, and though the steers lost in weight they appeared in perfect health. The average percentages digested were as follows: Protein 65.53, fat 74.01, nitrogen-free extract 60.75, crude fiber 29.11. The barley dust was fed 6 days; the steers lost weight and neither of them appeared to thrive. The average percentages digested were protein 59.82, fat 60.2, nitrogen-free extract 56.98, crude fiber 32.74. Corn meal was fed 8 days and both animals retained good health. The average percentages digested were protein 79.81, fat 94.8, nitrogen-free extract 88.48, fiber 83.92. The wheat bran was fed 5 days, and the average percentages digested were protein 75.18, fat 66.47, nitrogen-free extract 75.96, fiber 56.75.

"The corn meal was made by grinding whole corn and sold f. o. b. at the mill for $19 per ton. Barley dust contains all the hulls of barley, and our experiment shows it to be very high in crude fiber. For feeding purposes alone it is worth $5.25 per ton less than wheat bran and $2.25 per ton less than oat dust. Nevertheless it sells readily for $18 per ton. Oat dust, on the other hand, sells for $8 per ton and is worth for feeding purposes alone, when compared with bran, $17 per ton.

"These facts lead us to conclude: First, that the prices charged for by-products from the mills are no indication of their actual feed value; second, that the by-products from different mills must vary greatly in composition, and in many cases the market price is set from the inferior article."

The analyses and fertilizing value of the feeds are also given.

Experiments comparing the relative merits of short and long periods of feeding, noted in previous years (E. S. R., 19, p. 1169), were continued. The basal ration was ground barley, bran, hay, straw, roots, and silage. Eight steers fed for 77 days made an average daily gain per head of 2.25 lbs., whereas a similar lot fed for 168 days made an average daily gain per head of 2 lbs. The short-fed steers have returned higher prices for meal consumed in each of the experiments for the past three years than have the long-fed steers.

"So far as these results go, they indicate that steers which can be finished with about 2 months of feeding, may give fairly satisfactory returns with a spread of ½ ct. per pound between the buying and selling prices; but with steers which have to be fed 5 or 6 months, the feeder is hardly safe with a spread of less than 1¼ cts. per pound.

"The marked advantage of the short keep over the long keep steers is due to two things: (1) The greater original weight of the short keep steer, upon which the owner gets the advantage of the spread between the buying and selling price per pound; (2) the smaller amount of expensive meat which it is necessary for the owner to put upon the short keep steer to make him fit for the market."

An experiment was made in feeding loose *v.* tied steers and as in three previous experiments the loose steers ate more than tied steers and made larger gains.

A feeding experiment was made with pigs, lasting 120 days, in which dairy by-products were compared. The basal ration consisted of a grain mixture of barley, frozen wheat, and middlings. The group fed skim milk as a supplementary feed made an average daily gain per pig of 1.36 lbs. With buttermilk as a supplementary ration the corresponding gain was 1.23 lbs., with ordinary whey 1.16 lbs., and with separated whey 1.07 lbs. With water and the basal ration the gain was 0.7 lb.

In an experiment in which barley was compared with frozen wheat, one lot of pigs fed barley and middlings made an average daily gain per pig of 1.08 lbs. in 120 days. A lot fed frozen wheat and middlings made a corresponding gain of 1.1 lbs., and a lot fed a mixture of barley, frozen wheat, and middlings a gain of 1.18 lbs.

Alfalmo and gluten feed for fattening steers, W. J. KENNEDY (*Iowa State Col. Agr. Rpt., 1907–8, pp. 151, 152*).—A basal ration of corn and hay was fed for 140 days to 34 steers divided into two equal lots. The lot fed a supplementary ration averaging 3.22 lbs. per day of alfalmo, a commercial feed, made an average daily gain of 2.42 lbs., and yielded a profit of $1.56 per steer. The lot fed an average of 2.12 lbs. of gluten feed daily made an average daily gain of 2.11 lbs., and yielded a profit of $2.05 per steer.

Steer feeding, J. M. SCOTT (*Florida Sta. Rpt. 1908, pp. XXIII–XXVII*).—The data have been noted from another source (E. S. R., 20, p. 1066).

Cattle feeding experiments in Britain, H. INGLE (*Trans. Highland and Agr. Soc. Scot., 5. ser., 21 (1909), pp. 196–254*).—This is a summary of over 200 feeding tests with cattle between 1838 and 1908. The data collected are presented in tabular form.

The relation of feeds to the formation of renal calculi in rams, L. G. MICHAEL ET AL. (*Iowa State Col. Agr. Rpt., 1907–8, pp. 142–144*).—This is a preliminary report of a study of the effect of feeding roots on the excretion of nitrogen and phosphorus by the kidneys.

Mangels and sugar beets appear to affect the kidneys similarly. A small calculus was found in one kidney of a ram fed on sugar beets. The membrane about the calculus and extending down into the urethra was pigmented a decided black. In the kidney of a ram fed mangels the same kind of pigmentation occurred but no calculus was present. Both rams gained in weight throughout the experiment. The sugar beet-fed ram dressed 52.52 per cent of the live weight, the mangel-fed ram 48.9 per cent, and the dry-fed ram 41.92 per cent.

"The bodies of the sugar-beet ram and the mangel ram were much fatter than the dry-fed ram. This was especially true of the superficial fat about the kidneys. The increase in fat accounts for the gains in weight made by the root-fed rams and in part for the low percentage of body nitrogen. . . . On a fat free basis, the carcass of [the dry fed] ram contains 28.25 per cent protein, [the mangel fed] ram 30.28 per cent, and [the sugar beet] ram 30.56 per cent. This shows that the feeding of mangels and sugar beets is accompanied by a replacement of the 'red-flesh' of the animal by fat. The disappearance of the flesh is largely due to the washing out of the nitrogen by the large amount of water ingested with the roots. . . .

"These roots contained from 87 to 90 per cent of water. The immediate effect of this increased ingestion of water was an increased voiding of water with the urine and later, also, with the feces. . . .

"The specific gravity does not, as is so often stated, vary inversely as the volume of urine excreted. . . . The reason why the specific gravity does not vary markedly is that the increased excretion of water by the kidneys is accompanied by an increased excretion of dissolved solids. . . .

"About the third period of this investigation we began to notice that the volume of urine excreted, together with its density, had some relationship to the weight of nitrogen excreted. . . .

"This throwing off nitrogen with the increased ingestion of water may lead to the explanation of the added nitrogen requirement of dairy cows which are forced to ingest the greatest possible amount of water; this ingestion being followed by an increased milk flow without detriment to the quality of the milk. However, only a portion of the added water ingested goes to increase the milk

flow. The rest is voided as additional urine, which takes with it an additional amount of nitrogen. This calls for an additional amount of nitrogen over and above that required for milk solids and body maintenance."

The financial aspect of sheep washing, B. N. WALE (*Jour. Bd. Agr. [London], 16 (1909), No. 1, pp. 1–18*).—In this article the author shows the advantages of washing sheep before shearing. Figures are quoted to illustrate that even in a period of low prices the increased returns from washed fleece more than pay for the cost and risks of washing.

Sheep farming in Missouri, F. B. MUMFORD, E. R. STROETER, and E. A. TROWBRIDGE (*Missouri Bd. Agr. Mo. Bul., 7 (1909), No. 2, pp. 38, figs. 11*).—This is a popular article on sheep raising in Missouri. A list of publications on the subject is included.

[Feeding experiments with pigs], W. L. CARLYLE (*Colorado Sta. Rpt. 1907, p. 36*).—In these experiments 100 pigs were divided into 10 lots of 10 pigs each. In estimating the cost of gains all grain was valued at 80 cts. per hundredweight, alfalfa, and beets at $5 per ton, and tankage at $30 per ton. The feeding period was 102 days. The results were as follows:

Cost of pork production with different rations.

Feed.	Daily gain per pig.	Cost per pound gain.	Total profit on 10 pigs.	Feed.	Daily gain per pig.	Cost per pound gain.	Total profit on 10 pigs.
	Pounds.	*Cents.*			*Pounds.*	*Cents.*	
Barley, alfalfa	1.23	4.07	$30.36	Barley, shorts	1.37	3.56	$40.87
Corn, alfalfa	1.33	4.04	33.32	Barley, tankage	1.52	3.82	41.59
Barley, corn, alfalfa	1.49	3.59	43.96	Corn, tankage	1.65	3.65	48.06
Barley, wheat	1.35	3.61	39.81	Barley, beets	1.10	4.87	18.31
Barley, peas	1.36	3.61	39.90	Corn, beets	0.97	5.70	7.95

Feeding experiments with potato flakes and steamed potatoes at the Karstädt Experiment Station, SCHMIDT (*Dept. Landw. Presse, 36 (1909), No. 16, p. 173*).—Results obtained from a number of experiments with pigs showed that the gain in weight was faster with the flakes, but that steamed potatoes were more economical.

Swine in America, F. D. COBURN (*New York and London, 1909, pp. XV+614, pls. 64, figs. 55, map 1*).—This compilation of information was prepared as a text-book for the breeder, feeder, and student. The material, which was gathered from experience of breeders and from results obtained at the experiment stations, is so arranged and condensed as to be of use to the practical man engaged in swine production.

Bacon curing in Scotland, L. M. DOUGLAS (*Trans. Highland and Agr. Soc. Scot., 5. ser., 21 (1909), pp. 58–74, figs. 7; Separate, pp. 17, figs. 7*).—This is an account of the progress in pig breeding and bacon curing in Scotland, which has been slow as compared with England and Ireland. At present there seems to be a more favorable outlook for this industry in Ayrshire and Dumfriesshire, where a number of factories have been built for the purpose of curing bacon by the wet-cure process, viz, immersion in pickle instead of curing in the dry state as in the case of the Wiltshire bacon. Details of the process are given.

[Post horse service], E. ANXIONNAT (*Mém. Soc. Nat. Agr. France, 142 (1909), pp. 101–245*).—The author points out the value to agriculture of the post horse service from its establishment in 1597 by Henry IV until it was discontinued in 1873. The service required of post horses was severe and led to the importation of first-class breeding stallions of a lighter type than those used in war. As the stock improved the horses received better feed and care. Each

locality where post horses were kept became to some extent a center of improved agricultural methods.

Science and art of poultry culture, E. B. HAWKS ([*Clinton, Wis.*], *1909, pp. X+490, figs. 50, dgms. 8*).—The information contained in this practical textbook on poultry husbandry and its various branches was obtained largely from the experiment stations, poultry journals, and the experience of the author.

Poultry culture, A. A. BRIGHAM, J. H. ROBINSON, and H. D. SMITH (*Mass. [Bd.] Agr. Bul. 1, pp. 104, figs. 13, dgms. 2*).—This is a popular discussion of the poultry industry.

[Poultry experiments], A. G. GILBERT (*Canada Expt. Farms Rpts. 1907, pp. 242–261*).—The cotton front house was tested and found to be satisfactory. The birds remained in good health, none of the combs was frozen, a satisfactory number of eggs was laid, and a large percentage of the eggs were fertile.

Experiments were made in artificial hatching and rearing of chickens. During April and May a larger percentage of eggs were hatched by hens than by incubators. Heated and unheated poultry houses were contrasted, with the result that hens kept in unheated houses laid the more eggs. Results are tabulated which show the advantages of breeding prolific egg-laying strains by selection of the best layers.

[Poultry experiments], R. HARCOURT and W. R. GRAHAM (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 77–79, 164–169*).—The results of incubation experiments the past year were in accord with the findings of previous years; i. e., that there is a relationship between the vitality of the chick and the amount of lime which it contains at the time of hatching. There was also a relationship between the carbon dioxid evolved and the amount of lime absorbed by the chick.

"The ratio is not constant, but the greater the quantity of gas evolved the higher is the amount of lime absorbed. It would seem from this, then, that it is the chick with the greater natural vitality, the one with the freer and more healthy respiration while incubating which will absorb the most lime, and will, consequently, come out of the shell with the stronger and better built body, more likely to withstand the hardships connected with the early life."

The results obtained with different styles of poultry houses were practically the same as in previous years. The coldest or cheapest house built of single ply boards has given the best results, and the warmest, built of several thicknesses of board and paper with a 4 in. dead air space between the walls, has given the poorest results each winter.

Report of the departmental committee on poultry breeding in Scotland, J. MURRAY ET AL. (*Edinburgh, 1909, pp. 18*).—This report on the present status of the poultry industry of Scotland deals with the methods commonly followed in breeding, keeping, and marketing poultry. Suggestions are also made for the improvement of this industry.

Further results of transplantation of ovaries in chickens, C. C. GUTHRIE (*Jour. Expt. Zool., 5 (1908), No. 4, pp. 563–571, figs. 3; abs. in Ztschr. Induktive Abstam. u. Vererbungslehre, 1 (1909), No. 5, pp. 471, 472*).—Ovaries were exchanged between 2 black and 2 white Leghorn pullets weighing 650 gm. each. The transplanted ovaries seemed to function in a normal manner, for there were no marked differences in egg production between the operated and control hens, nor in the fertility of the eggs. The color of the chickens showed the eggs from the operated hens to be from the transplanted ovaries, yet the foster mother exerted an influence on the color of the offspring.

Data on the inheritance of fecundity obtained from the records of egg production of the daughters of "200-egg" hens, R. PEARL and F. M. SURFACE (*Maine Sta. Bul. 166, pp. 49–84, figs. 4*).—This bulletin is the second paper

of the series on the physiology of reproduction in the domestic fowl (E. S. R., 21, p. 271).

Experiments are reported in which "registered pullets" (daughters of 200-egg hens) are compared with their mothers and with unregistered pullets in respect to egg production when given the same treatment as to housing, feeding, and care. Two hundred and fifty Barred Plymouth Rock pullets, each the daughter of a 200-egg hen, were divided into five equal flocks. All the birds were trap nested from November 1, 1907, to July 1, 1908. The registered mother hens averaged to lay 58.8 eggs per bird between November 1 and March 1, or a percentage production of 46.5. The daughters averaged 15.29 eggs per bird, a percentage production of 12.7. The egg production of the registered mother hens in the spring months, from March 1 to July 1, averaged 59.13 eggs, a percentage production of 64.4. The daughters averaged 46.61 eggs, a percentage production of 59.7. "There is no reason whatever to suppose that these averages would have been any nearer together if records for the daughters had been taken for the whole year."

Constants of variation and correlation measuring the degree of inheritance were determined. The constants of variation were found to be as follows: The standard deviation of variation in egg production of the mothers when unweighted in winter was 14.06±1.2, in spring 7.73±0.66; of the mothers when weighted with their fecundity in winter 14.93±0.51, in spring 8.41±0.3, in total production 12.69±0.45; of the daughters in winter 16.1±0.55, in spring 18.1±0.64, in total production 26.38±0.94. The coefficient of variation in egg production of the unweighted mothers in winter was 25.2±2.29, in spring 13.07±1.13; when weighted with their fecundity in winter 26.57±0.97, in spring 13.8±0.49, in total production 9.32±0.33; of the daughters in winter 101.14±6.44, in spring 38.66±1.54, in total production 35.43±1.41.

The coefficient of correlation between mothers and daughters in winter egg production was −0.068±0.048, in spring egg production +0.023±0.050, total egg production −0.055±0.050; between the mother's individual performance and her daughter's average performance in winter −0.329±0.108, in spring +0.034±0.121. The daughters show a greater variation than their mothers, but there appears to be no appreciable correlation between daughter and mother in respect to egg production ability. "The data so far obtained do not indicate that egg-producing ability is sensibly and directly inherited between mother and daughter. There may be such an inheritance but further data are needed to demonstrate it."

Six hundred "unregistered pullets" which received precisely the same treatment but whose mothers were birds laying between 150 and 200 eggs in their pullet year were tested. The egg production of 350 of these is shown in the form of frequency distributions. The means and constants of variation were deduced and compared with the registered pullets.

"The mean egg production of the 'registered' pullets (daughters of '200-egg' hens) is, with a single exception, smaller than the egg production of the 'unregistered' birds (not daughters of '200-egg' hens), regardless of the season of the year or of the size of the pens in which the 'unregistered' birds were kept. The single exception to this rule is found in the comparison with reference to spring production between the 'unregistered' birds kept in a flock of 100 and the 'registered' birds. The difference, however, in this case is small and only arises because of the fact that the 'unregistered' birds in the 100-bird pen made an exceptionally bad record during the spring months as compared with the other 'unregistered' birds." The daughters of 200-egg hens do not conform so closely to type as do the birds which are not daughters of 200-egg hens.

The results of these investigations agree with those obtained by other workers with different plants and animals and show that the chief, if not the entire, fune-

tion of selection in breeding is to isolate pure strains from a mixed population. It is found in actual experience impossible to bring about by selection improvement beyond a point already existing in the pure isolated strain at the beginning.

The authors suggest that the term "fecundity" be used only to designate the innate potential reproductive capacity of the individual organism as denoted by its ability to form and separate from the body mature germ cells, and that the term "fertility" be used to designate the total actual reproductive capacity of pairs of organisms, male and female, as expressed by their ability when mated together to produce individual offspring. "Fertility, according to this view, depends upon and includes fecundity but also a great number of other factors in addition. Clearly it is fertility rather than fecundity which is measured in statistics of births of mammals."

Our knowledge of melanin color formation and its bearing on the Mendelian description of heredity, O. RIDDLE (*Biol. Bul., 16 (1909), No. 6, pp. 316–351*).—This is a study on the production and inheritance of colors in animals.

The author thinks that many Mendelian interpretations, and in particular those on color inheritance, are not sound, because some of the factors arise outside of the germ cell during development as a direct result of tissue differentiation quite independent of a definite determiner in the gametes. The basis of the author's objections rests upon the origin and development of melanin pigments. The work of the author and other investigators on tyrosin and related aromatic compounds, which are concerned in the production of melanins in the albumen molecule, is briefly reviewed. Melanins are the result of oxidation induced by tyrosinase, a widely distributed oxidizing agent. Each chromogen produces several colors, depending upon the degree of oxidation involved. The melanin colors pass through a series of colors before arriving at the final stage of oxidation, early stages being lighter than later ones.

Pathogenic conditions in the human body show that the power of an organism to oxidize tyrosin compounds is dependent upon tissue and not upon germinal segregation. Also, the colors of amphibia may be controlled by nutrition. We have thus a long series of color characters which have for a basis the general protoplasmic power to oxidize tyrosin compounds. They are not unit characters but are continuous gradations. The oxidizing power as a process may be strengthened or weakened in the subdivision of nuclear matter during maturation, whereas Mendelian interpretations see only particles segregated. It is stated also that Mendelian interpretors have declared for the doctrine of preformation, while the author's theory is essentially epigenetic. It is suggested that further studies may show that other Mendelian discontinuities may have gradations and that other qualitative differences may appear more as quantitative sequences. The literature on the subject is appended.

Facts concerning the determination and inheritance of sex, H. E. JORDAN (*Pop. Sci. Mo., 74 (1909), No. 6, pp. 540–550*).—This is a popular review of some recent work on the accessory chromesome and dimorphic spermatozoa and their significance in the determination of sex, which the author summarizes as follows:

"The present status of the case concerning the determination of sex, as well supported for a large class of plants and animals, appears to be that sex is determined by the spermatozoa (or pollen grains)—which are male and female in the proportion of 1:1—and at the instant of fertilization. But surely it would be the utmost folly to hold on the basis of so comparatively few facts, that this explanation applies universally. Nature arrives at similar ends by devious and divers ways and it is not inconceivable that sex has been attained by several paths, and is now determined in different modes and at different times in the different groups of animals and plants."

DAIRY FARMING—DAIRYING—AGROTECHNY.

Report of the animal industrialist, J. M. Scott (*Florida Sta. Rpt. 1908, pp. XVII–XXIII*).—Two feeding tests were made with dairy cows. In the first test cotton-seed meal was contrasted with coconut meal as a supplement to a basal ration of wheat bran and shorts. The results of three feeding periods of 21 days each are summarized, and show that 252 lbs. of cotton-seed meal, fed with bran and shorts, produced 1,888.5 lbs. of milk, while 453 lbs. of coconut meal, fed with bran and shorts, produced 1,844 lbs. of milk. "The conclusion that we may draw from this test is that 1 lb. of cotton-seed meal is nearly equal to 2 lbs. of coconut meal for milk production."

In the second test sorghum silage and sweet potatoes were contrasted as supplementary feeds, the basal ration consisting of cotton-seed meal and wheat bran. "The results were that 4,819.5 lbs. of sweet potatoes produced 3,122.25 lbs. of milk, while 6,898.5 lbs. of sorghum silage gave 2,800.25 lbs. of milk. In other words, 100 lbs. of sweet potatoes with cotton-seed meal and wheat bran produced approximately 65 lbs. of milk, while 143 lbs. of silage with the same amount of cotton-seed meal and wheat bran produced about 58 lbs."

Experiments with dairy cows, G. E. Day (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 138–142, fig. 1*).—Herd records are reported, together with feeding trials in which oats and bran were contrasted with Schumacher and Molac dairy feeds.

The average yields of milk per day per cow were as follows: In the first experiment with oats and bran, 25.71 lbs. of milk containing 3.85 per cent fat, and with oats and Molac, 25.57 lbs. of milk containing 3.76 per cent fat; in a second experiment, oats and bran, 35.45 lbs. of milk containing 3.68 per cent fat, and with bran and Schumacher feed, 33.43 lbs. of milk containing 3.45 per cent fat; in a third experiment, bran and oats, 26.83 lbs. of milk containing 3.98 per cent fat, and with Molac and Schumacher feeds, 27.93 lbs. of milk containing 3.74 per cent fat.

"The amount of Molac fed in the first experiment was less than the amount of bran, and the Schumacher fed in the second experiment was less than the amount of oats. It might have been more satisfactory had the amounts been equal in each case, but the reduction was made because it is claimed that Molac contains more nutriment than bran, and that Schumacher contains more nutriment than oats, and an attempt was made to equalize the rations."

The grape as a feed for dairy cows, G. Fascetti and N. Fotticchia (*Agr. Mod., 15 (1909), Nos. 13, pp. 170–172; 14, pp. 188–190; 16, pp. 212–214*).—Grapes were mixed with a ration of bran, maize cake, meadow hay, and alfalfa and found to be palatable and nutritious. They were estimated to be worth about 4 lira per quintal (about 35 cts. per 100 lbs.) as a dairy feed, which is somewhat higher than would be expected from a chemical analysis, which was as follows: Protein, 0.862; fat, 0.306; nitrogen-free extract, 16.711 per cent.

Importance of the dairy industry for the Latin-American countries (*Bol. Min. Agr. [Buenos Aires], 10 (1908), No. 3, pp. 240–262*).—Statistics are presented as a basis for showing the importance of making more progress in the dairy industry in South American countries.

Pure milk and the public health, A. R. Ward and M. E. Jaffa (*Ithaca, N. Y., 1909, pp. XIII + 218, figs. 17*).—This is a manual for the milk and dairy inspector, in which are assembled facts needed by the health officer and others directly concerned in the crusade for better milk. The principal topics treated are equipment of a sanitary dairy plant, proper methods of handling milk, the changes in milk caused by bacteria, epidemic diseases transmitted by milk,

municipal sanitary control, and the methods of microscopical, bacteriological, and chemical examination of milk. Each chapter is accompanied by a list of references bearing on the subject discussed.

Voluntary stall and milk control by the Verein Berliner Molkereibesitzer, SCHROTER (*Pure Products, 6 (1909), No. 5, pp. 227–229*).—This is a brief account of an association of dairymen in the vicinity of Berlin whose object is to produce clean and pure milk at a moderate cost. The character of the product has been materially raised since the formation of the association. The expense of inspecting herds, stables, and methods of milking is met by the members.

Milk records, J. SPEIR (*Trans. Highland and Agr. Soc. Scot., 5. ser., 21 (1909), pp. 175–196*).—An account of the work of the milk record societies in Scotland for the year 1908. During the year 8,132 cows were tested, more than twice as many as were tested the year before.

Investigations on the milk production of goats, WEBER (*Milchw. Zentbl., 5 (1909), No. 5, pp. 193–208*).—The author reviews the work of other investigators on the yield of milk and milk fat by goats and furnishes some additional data from which it appears that the annual yield of a goat equals about 10 times its own weight or 500 kg. of milk, containing from 2.6 to 2.7 per cent fat. The literature on the subject is appended.

Influence of temperature on milk yield, J. SPEIR (*Trans. Highland and Agr. Soc. Scot., 5. ser., 21 (1909), pp. 255–306*).—This is an account of experiments in the production of milk in winter under free *v.* restricted ventilation. Experiments were made on 5 different farms and involved 100 cows.

From the tabulated data the author concludes that rather more milk has been produced under conditions of free ventilation than where ventilation was restricted, but until these results have been corroborated by other trials it will be injudicious to consider that this will invariably happen. It is unquestionable that the general health of the cows will be better under free than under restricted ventilation.

Investigations on the milk of spayed cows, J. ROSSMEISL (*Biochem. Ztschr., 16 (1909), No. 2–3, pp. 164–181*).—Work of other investigators is reviewed and the author reports results of his own work on milk from 5 spayed cows. In all cases the annual production of milk was increased and in 4 of the cows the percentage of fat. In 2 cows the lactation period was shortened. Three of the cows gained in body weight and 2 lost.

[Report of] the professor of dairy husbandry, H. H. DEAN (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 97–127*).—A trial of the Hart casein test (E. S. R., 19, p. 707), with 22 samples gave results 0.0464 per cent higher than by chemical analyses. In only 1 case was the difference more than 0.2 per cent, and in most cases the difference was less than 0.1 per cent. It was found that this test was not adapted for composite sampling.

In a study of the variation of the casein content of milk of 9 individuals representing 3 different breeds, the average percentage of casein in the Holstein milk was 2.15, in the Ayrshire 2.39, and in the Jersey 2.56. The relation of milk casein to milk fat by breeds was Holsteins, 0.63 lb. casein per pound of fat in the milk, Ayrshires, 0.61, and Jerseys, 0.53. Among the Holsteins the extreme variation in the percentage of fat in one day's milk was from 3.2 to 4.6. The casein varied from 1.8 to 3.6, but the extremely high tests were at a time when the cows were nearly dry and were being milked but once a day.

"The variation in the percentage of casein in milk does not appear to be so great as is the variation in the percentage of fat in milk. Generally speaking, milk with a high percentage of fat contains also a high percentage of casein, but the increase of the casein is not relatively so great as the fat."

The effect of casein on the content of fat in milk is presented in tabular form. "As cows advance in lactation they tend to increase in both the percentage of fat and casein in their milk. This is more marked when we compare the milk just before 'drying up' with that given soon after freshening. The evidence as to the effect of season on the percentage of casein in milk is somewhat conflicting."

Two series of experiments were conducted to determine the relation of casein in milk to the quantity and quality of the cheese produced.

"The average casein tests of the vats of milk in the cheese room were lowest and fairly uniform for the months of April (2.3), May (2.28), and July (2.31). The highest vat tests were for June (2.46), September (2.45), and October (2.61). All the testimony seems to agree that the June milk is comparatively high in casein.

"The cheese experiments confirm previous conclusions, viz., that the yield of cheese is not in proportion to the fat in the milk. The pounds of cheese per pound of casein in the milk were fairly uniform throughout the season, the extreme variation by months being 3.87 to 4.1. . . .

"The addition of the factor 2, to the percentage of fat in the milk, makes a fairly reliable basis for distributing proceeds of sales at cheeseries. At present, we do not think daily, or weekly testing of milk for casein is practicable in factory work, but a Hart casein tester along with the Babcock tester ought to be a part of the equipment in every cheese factory, to be used as required."

Experiments were made in making butter from whey. It was found that about 2½ lbs. of fair quality butter could be made from 1,000 lbs. of whey, but that it did not pay to make whey butter in small factories. It is advisable to pasteurize the whey wherever possible.

In a study of moisture in butter and cheese, 15 comparative tests of butter made with the high and low pressure oven and with samples varying in weight from 2.5 to 20 gm., gave average results of 14.69 per cent moisture by using the high-pressure oven at a temperature of 250 to 300° F., and 14.36 per cent by the low-pressure oven with temperatures of 212 to 219°. Whether the tendency for slightly higher results by using the high-pressure oven "was due to more complete drying or to oxidation of some of the fat, we are unable to say, but are inclined to think it was due to the latter, as the fat always appeared darker in color from the samples placed in the oven at the higher temperature. However, we do not think that any serious error is likely to be introduced by using the high-pressure oven, and as the results are got more quickly as compared with the low-pressure oven, we are inclined to favor the former." . . .

The average of 24 experiments with cheese where curds were not stirred gave 55.062 per cent moisture in the curds at the time of dipping, whereas similar experiments where the curds were stirred averaged 48.468 per cent. In the green cheese the average percentages of moisture in the 24 lots from curds not stirred was 35.664, and from the lots stirred in the usual way 34.877. The marketable cheese from curds not stirred showed an average of 35.017 per cent, while the lots from stirred curds tested an average of 34.771. The advantage of not stirring lies in the saving of labor and of the milk solids remaining in the cheese after the moisture has evaporated.

Coagulating agents other than rennet have proved unsatisfactory because more solids were left in the whey. Milk solids lost in making cheese from overripe milk were about the same as from normal milk, which is contrary to the common belief. The curds from the lots of overripe milk remained in the whey an average of 53 minutes. The yield of ripe cheese per 1,000 lbs. of milk was 91.3 lbs. with an average score of 93.3. The total solids in the milk averaged

12.16, and the solids in the whey averaged 6.8 per cent. The curds from the normal lots were in the whey an average of 2 hours and 55 minutes, and yielded 94 lbs. of cheese per 1,000 lbs. milk, with an average score of 95. The milk averaged 12.24 per cent solids, while the whey contained 6.71 per cent solids, or an average of but 0.09 per cent less than did the whey from the overripe milk.

Fifteen experiments were made with curds from normal milk, comparing a perpendicular curd knife made of fine wire and having the wires ¼ in. apart with a coarser wire knife having the wires ⅜ in. apart. Altogether there were 12,822 lbs. milk used, testing an average of 3.71 per cent fat. The whey from the lots cut with the fine knife tested an average of 0.23 per cent fat, and that from the lots cut with the coarser wire knife tested 0.26 per cent. The yields of ripened cheese per 1,000 lbs. milk were 95.3 and 95.7 lbs., and the average scores 93.6 and 93.9 respectively. It is stated that it is difficult to account for the increased yield of cheese by using the coarse knife, except that the latter cheese may have contained more moisture.

The common method of pressing curds was compared with a gradual, light pressure. The results indicated that light, gradual pressing produces more cheese and that both green and ripe cheese contain the slightly less moisture. Heavy pressure applied at once to curds yielded about the same amount and quality of cheese as the common method of pressing. Two experiments were made to note the effect of adding 0.25 per cent of borax to curds at the time of adding salt. Very little difference was found in the general quality, and it would appear that under these conditions preservatives have little or no effect upon the cheese.

In studying the temperature of wash water in butter making it was found that in the months of April and May butter washed with water at a temperature of 58° F. gave an increased overrun of about 0.5 per cent, as compared with lots washed with water at 50°. "This extra overrun appears to have been practically all extra moisture in the butter, as the tests for moisture indicated about 0.5 per cent more water in the lots washed in water at the higher temperature. There was little or no difference in the quality of the butter, either when fresh or when held for a month or more." In an experiment in pasteurizing cream a smaller yield but a better quality of butter was obtained than with raw cream. In the experiment with preservatives, borax produced no marked difference in grain and quality from that with a commercial preservative.

On the changes in the acidity of milk by heating, W. Van Dam (*Milchw. Zentbl., 5 (1909), No. 4, pp. 154, 155*).—In continuation of earlier work (E. S. R., 20, p. 1178), the author finds that though the potential acidity of milk is decreased by heating, the concentration of hydrogen ions is increased.

Investigations on milk serum, II. Lührig (*Molk. Ztg. [Hildesheim], 22 (1908), No. 45, pp. 1291–1293; abs. in Rev. Gén. Lait, 7 (1909), No. 12, p. 284; Milchw. Zentbl., 5 (1909), No. 3, p. 132*).—The specific gravity of serum from milk that coagulates spontaneously was found to be lower than that obtained by coagulation with acetic acid. The ash content of the serum is not altered when the serum is preserved for a considerable time.

On the reducing properties of milk and the Schardinger reaction, R. Tromsdorff (*Centbl. Bakt. [etc.], 1. Abt., Orig., 49 (1909), No. 2, pp. 291–301; abs. in Chem. Zentbl., 1909, I, No. 12, pp. 1030, 1031; Jour. Chem. Soc. [London], 96 (1909), No. 558, II, p. 330*).—The author reviews the work of other investigators and describes his own experiments. He concludes that fresh milk which is germ free contains no reductases, although it gives a characteristic reaction

to formalin and methylene blue. The nature of the "Schardinger ferment" is not known. The literature on the subject is appended.

On the identity of the milk coagulating and the proteolytic ferments, W. W. SAWITSCH (*Ztschr. Physiol. Chem., 55 (1908), No. 1, pp. 84–106; abs. in Milchw. Zentbl., 5 (1909), No. 2, pp. 95, 96*).—From the investigations reported, the author thinks that the proteolytic and coagulating enzyms are identical.

Rennet, J. EFFRONT (*Monit. Sci., 4. ser., 23 (1909), I, No. 809, pp. 305–325*).—This is a review of the more important work by the author and other investigators concerning the nature of rennet and its action on the coagulation of milk when modified by chemical and physical agents.

Action of rennet at different temperatures, C. GERBER (*Compt. Rend. Acad. Sci. [Paris], 147 (1908), No. 24, pp. 1320–1322; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 557, I, p. 196*).—This is a study of the deviations from the law that the time required to coagulate a given quantity of milk is inversely proportional to the amount of ferment added. It was found that these deviations increase with the temperature and are largest with rennet that contains a high proportion of saline matter. Hydrochloric acid, and in a greater degree, calcium chlorid, accelerates the action.

Studies of buttermilk, A. BURR (*Milch Ztg., 38 (1909), Nos. 1, pp. 2–5; 2, pp. 13–16; 3, pp. 27–29; 4, pp. 40–42*).—A review of investigations on the chemical, physical, and physiological properties of buttermilk.

Some bacteriological investigations of dairy products, H. WEIGMANN, H. HUSS, and A. WOLFF (*Milchw. Zentbl., 5 (1909), No. 1, pp. 2–12*).—Numerous samples of abnormal milk and milk products were examined and found to be due either to bacteria, yeasts, or molds.

The cause and nature of bitter milk, A. WOLFF (*Milchw. Zentbl., 5 (1909), No. 2, pp. 67–73; abs. in Chem. Zentbl., 1909, I, No. 11, p. 931*).—The author found large numbers of bacteria on the leaves of grass, white clover, and yarrow where cattle were feeding. About 80 per cent belonged to the coli group. Unless the udders of cows are washed these bacteria may fall into the milk pail in sufficient numbers to cause the bitter taste often noticed.

On some fungi that produce the turnip taste in butter, H. WEIGMANN and A. WOLFF (*Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 24–25, pp. 657–671, pls. 6*).—A continuation of earlier work (E. S. R., 20, p. 180).

Penicillium brevicaule and several other fungi, which were present in large numbers in the food and litter of stables and were thought to be the cause of the turnip flavor in milk, were isolated and grown as pure cultures. Descriptions of each fungus are given in detail and their relationships are discussed.

What micro-organism contributes to the formation of the reddish-yellow coloring matter on the upper surface of cheese in curing cellars, A. WOLFF (*Milchw. Zentbl., 5 (1909), No. 4, pp. 145–154*).—This is a study of the superficial flora of cheese. Descriptions are given of 9 species of bacteria, some of which are new, which the author obtained from the surface of Tilsiter, Romadour, and cream cheeses.

On the red spots of Emmenthal cheese produced by Bacterium acidi propionici rubrum, J. THÖNI and O. ALLEMANN (*Landw. Jahrb. Schweiz, 22 (1908), No. 2, pp. 46–52, pl. 1; Rev. Gén. Lait, 7 (1909), No. 11, pp. 241–251; abs. in Milchw. Zentbl., 4 (1908), No. 11, p. 518*).—Cultures of a bacterium taken from abnormal red spots of Emmenthal cheese were plated and its characteristics found to be similar to the organisms found by Von Freudenreich and Jensen (E. S. R., 18, p. 177). As the new species has also the power to produce a red pigment as well as propionic acid, the authors have named it *B. acidi propionici rubrum*.

"Soaked" and "washed" curd (*N. Y. Produce Rev. and Amer. Cream., 28 (1909), No. 1, pp. 28, 29*).—This is a symposium by different cheese makers.

Cheese curd may sometimes be improved by washing in order to remove defects. If cheese is allowed to soak for 5 or 10 minutes so much moisture is absorbed that its quality is impaired, but there is a difference of opinion as to how long cheese may remain in the water before it shall be branded as soaked curd cheese. In the execution of pure food laws in many cases it is difficult for the inspector to draw the line between soaking and a beneficial washing unless the law defines the amount of moisture that cheese may contain.

Cheese making for small holders, J. BENSON (*Jour. Bd. Agr. [London], 16 (1909), No. 2, pp. 89–99*).—The author points out the international reputation of small cheeses made in France, where the holdings are small, and thinks that small fancy cheeses of distinct types should be made in England. Methods are described for making two varieties of pressed cheese and two varieties of soft cheese which can be made on a small scale.

[A study of guava jelly], J. BELLING (*Florida Sta. Rpt. 1908, pp. CV–CIX*).—The aim of this experiment was to ascertain a condition for making a product uniform in consistency, taste, and color. Studies were made of preliminary heating, final temperature, color, and the effect of different percentages of water, sugar, and acid.

"The preliminary heating of the fruit is essential to make the juice pass readily through the filtering cloth. It also seems to help in extracting the flavor. This flavoring quality does not appear to reside in the oil glands of the rind. An analysis . . . showed that the juice from guava fruit which had been steamed for half an hour in a double boiler, contained 9.6 per cent of total solids as compared with 5.9 per cent in the juice pressed out of the unheated fruit. Probably some of these extra solids are pectins extracted by the action of the hot acid of the fruit. This acid in both cases was about 1¼ per cent of the juice and the juice formed more than half of the weight of the fruit. . . .

"The best jelly made was obtained by using equal parts of undiluted juice and sucrose without adding any water and boiling to 113° C. It was clear pink, quite firm, not sticky, and was voted of excellent flavor. . . . A jelly can be made with only one-quarter as much pure guava juice as sugar; yet, since a well-flavored jelly is what is required, it would seem better to use equal quantities of juice and sugar. . . .

"In the boiling of guava jelly some acid (the natural acid of the ripe fruit) is absolutely necessary to change much of the sucrose into invert sugar, and if this does not take place then the sucrose crystallizes out. Too much acid (and probably too prolonged boiling) seems to make the jelly sticky from the excess of invert sugar, and also to alter the pectin so that it will not gelatinize. . . .

"The depth of color seems to be increased by additional amount of acid, prolonged boiling, and higher temperature at which the boiling is stopped."

General directions are given for making guava jelly and guava juice.

Experiments with fruit drying, G. LIND (*K. Landtbr. Akad. Handl. och Tidskr., 47 (1908), No. 5–6, pp. 403–423, figs. 15*).—Different drying houses and machines used in the manufacture of dried fruit are described and illustrated.

The technique of desiccation, O. BECHSTEIN (*Sci. Amer. Sup., 67 (1909), No. 1742, pp. 332–334, figs. 16*).—This is a brief account of the growing importance of the artificial drying of agricultural products. The kinds of apparatus used in drying, which are figured and described, are an apparatus for drying spent beet chips by means of gases at a temperature of 1,500° F., a stationary and a portable dryer for beet tops and leaves, potatoes, hay, etc., and a roller dryer for drying potatoes and potato flakes, milk, yeast, blood, and other substances by steaming the material and then working into flakes.

VETERINARY MEDICINE.

Eleventh report of the Maryland Live Stock Sanitary Board and State veterinarian (*Rpt. Md. Live Stock Sanit. Bd. and State Vet., 11 (1907), pp. 52*).—Brief reports for the period from December 1, 1905, to November 30, 1907, are presented by the chief veterinarian inspector (pp. 3–8), and by the live stock sanitary board (pp. 9–12). The two addresses given, one by A. D. Melvin entitled Future Work in Eradicating Tuberculosis (pp. 13–20), the other by J. R. Mohler and H. J. Washburn entitled Tuberculosis in Hogs, with Special Reference to its Suppression (pp. 21–52), have been previously noted (E. S. R., 20, pp. 981, 982).

Fourth annual report of the Minnesota State Live Stock Sanitary Board, 1907, S. H. Ward et al. (*Ann. Rpt. Minn. Live Stock Sanit. Bd., 4 (1907), pp. 76, pls. 4*).—Reporting upon tuberculosis it is said that the majority of the large breeders of the State have had their herds tested with tuberculin. A table given by counties of cattle tested and killed on account of the disease shows a total of 18,022 cattle that have been tested, of which 1,165 were killed.

A smaller number of outbreaks of glanders was recorded during the year than at any other time. A serious outbreak of hog cholera was experienced during the year. Notwithstanding the many outbreaks of rabies that were experienced during the winter, it was impossible to obtain any legislation along any line looking to the control of the disease. A number of complaints were received of losses from stomach worms of sheep. Reports of verminous bronchitis were received during the winter months and occasioned some losses.

A report on bacteriology by W. L. Beebe (pp. 31–48) includes detailed accounts of trips made to investigate disease outbreaks and the results of bacteriological examinations. The diseases thus reported are rabies, hemorrhagic septicemia, swamp fever, tuberculosis, maladie du coit, diarrhea in cattle, vulvitis in cattle, malignant catarrh, and influenza.

Under the title Dissemination of Tuberculosis by the Manure of Infected Cattle, M. H. Reynolds presents a report (pp. 49–58) of investigations previously noted from another source (E. S. R., 19, p. 986).

Fifth annual report of the Minnesota State Live Stock Sanitary Board, 1908, S. H. Ward et al. (*Ann. Rpt. Minn. Live Stock Sanit. Bd., 5 (1908), pp. 39, pls. 4*).—About 15 cities require the tuberculin testing of their dairy cattle and 27,000 cattle have been tested during the year. During this period there was a total of 206 outbreaks of hog cholera in 23 counties. Work upon swamp fever is being carried on at the station in cooperation with the Bureau of Animal Industry of this Department. Several outbreaks of Johne's disease were encountered during the year and one outbreak of anthrax appeared. Stomach worms caused more or less loss to flock owners and there were several outbreaks of blackleg.

In a report on bacteriology by W. L. Beebe (pp. 22–32) details are given of investigations made of outbreaks of anthrax, suspected hemorrhagic septicemia, forage poisoning, swamp fever, suspected ptomaine poisoning in hogs, malignant catarrh, and Johne's disease.

Second annual report of the Live Stock Sanitary Board, 1908 (*Ann. Rpt. Live Stock Sanit. Bd. N. Dak., 2 (1908), pp. 129, pls. 10, fig. 1*).—This report covers the year ended November 1, 1908.

Glanders and glanders-farcy are said to have required the greater portion of the efforts of the live stock sanitary officials. During the last 18 months 1,364 animals were condemned and 1,726 quarantined, due to this disease. Mange was

quite prevalent in several counties. Two cases of dourine were reported during the year. An outbreak of necrotic dermatitis which occurred among horses in one county was eradicated with considerable difficulty. Swamp fever, which has been a source of great loss to horse owners in Red River Valley during the year, caused considerable loss in the Turtle Mountain region in the western part of the State.

Very satisfactory progress is said to have been made toward the eradication of scabies in cattle. Blackleg was reported existing in three counties. Due to an epidemic of anthrax in the southern part of South Dakota, in which some 3,000 animals were lost, a quarantine was placed on all territory where the disease existed. Hog cholera was the source of considerable loss in the Red River Valley.

In the report of the bacteriologist and consulting veterinarian, L. Van Es (pp. 31–63), laboratory examinations are presented in tabular form. An account is given of the method in use in the preparation of tuberculin. The preparation of hog cholera serum has been taken up and the author describes the method of preparing this serum and its application in an outbreak of hog cholera in the college herd.

"After the introduction of infection 74 healthy swine were injected. Of those animals, one died from accidental sepsis. A month after the first serum injection two cases of cholera occurred. This makes a total of three deaths from cholera in 74 injected hogs, and it is our opinion that even this loss could have been prevented by using the simultaneous virus-serum injection in the first place, instead of depending on the natural exposure of infection.

"From this observation, and also by carefully considering the time of sickness of the check hogs, it would appear that even in the presence of sick hogs in the herd the contagion is not simultaneously introduced in all members of the herd, and when during the very beginning of an outbreak we immunize the herd, it may be questioned if all hogs had an opportunity to have their immunity rendered active during the period when their passive immunity is in force. While they failed to have been thus exposed during their passive immunity, and happen to make contact with infection afterward, they would not be protected and become sick. This is, in our opinion, responsible for our three cholera cases after the first injection. . . .

"From our experience it would seem advisable to practice the simultaneous virus-serum injection in all herds in which infection had not yet been introduced, and also in those where immunization is undertaken at the beginning of the outbreak and in which only a limited number of cases have occurred. Also in herds which are divided in several separate lots, the simultaneous method should be used. Our results in the college herd clearly bear out the claims of the Bureau of Animal Industry, that in this method we have a very efficient means of checking this disease. . . . The author is confident that if such measures be promptly taken, the danger from cholera can be reduced to insignificant proportions."

Reports of the executive officer, minutes of meetings, and the regulations regarding the importation of live stock into the State are included.

Report of traveling pathologist and protozoologist, C. M. Wenyon (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 121–168, pls. 7, figs. 13, map 1*).—This is a report of investigations made in connection with the floating laboratory on the Nile and its tributaries. Trypanosomiases in domestic animals, including camels, donkeys, and mules, and their treatment are reported upon, and descriptions of the trypanosomes discovered in various animals are presented. Flagellates found in biting flies, Plasmodia, Hemopro-

teus, Halteridium, Hemocystidium, Babesia, Hemogregarina, Leucocytozoa, and Helminthes discovered are described. A bibliography of 55 titles is appended to the account.

The origin of the recent outbreak of foot-and-mouth disease in the United States, J. R. MOHLER and M. J. ROSENAU (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 147, pp. 29, fig. 1; abs. in Jour. Amer. Med. Assoc., 52 (1909), No. 21, pp. 1679, 1680, fig. 1*).—In this circular the authors consider the nature and characteristics of the disease, its occurrence in man, and give a history of recent outbreaks. Various theories as to the source of infection in the recent outbreak, such as its introduction with imported live stock, by immigrants carrying the virus on their clothing, its entry through hay or straw used for packing, or in biological products, are then discussed, and investigations conducted by the authors, including experiments with vaccine virus, are reported in detail.

It is shown that the recent outbreak of the disease in this country started from calves used to propagate smallpox vaccine virus and that the outbreak in 1902–3 probably had a similar origin.

"The vaccine virus used on these calves has been proved to contain the infection of foot-and-mouth disease. . . . It is probable that the foot-and-mouth infection got into the vaccine virus in some foreign country where the disease prevailed, and was introduced into the United States through the importation of this contaminated vaccine.

"The symbiosis between the infections of vaccinia and foot-and-mouth disease is especially interesting. Animals vaccinated with the mixed virus, as a rule, show only the lesions of one of these diseases, viz, vaccina; nevertheless the infectious principle of foot-and-mouth disease remains in the vaccinal eruption."

Plague bacilli in ecto-parasites of squirrels, G. W. MCCOY (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 16, p. 475*).—*Bacillus pestis* was proved to be present in the bodies of the flea (*Ceratophyllus acutus*) taken from infected ground squirrels (*Citellus beecheyi*), also in feces passed during 72 hours succeeding its removal from the host. It was also proven to be present in a louse (probably *Hæmatopinus montanus*) taken from plague infected squirrels.

Bacillus lactimorbi, n. sp. Its relation to milk sickness and trembles, E. O. JORDAN and N. M. HARRIS (*Abs. Science, n. scr., 29 (1909), No. 756, pp. 1010, 1011*).—This description and account was presented at the meeting of the Society of American Bacteriologists held at Baltimore, December 29–31, 1908.

This organism appears to be a hitherto undescribed bacterium and was isolated by the writers from several cases of trembles in cattle, from one case of the disease in a horse, from two lambs, and from four cases of milk sickness in the human subject. It would seem that the disease in man is incurred through the ingestion of infected milk, milk products, or of meat; in animals by the eating of infected pasturage or by drinking infected water, the contamination of these being from the soil in which the bacterium has its abode. By means of pure cultures the authors succeeded in reproducing the essential features of the naturally acquired disease in young rabbits, dogs, calves, and one horse. Cats and lambs have been infected with the production of pathological lesions, but without any well-defined clinical symptoms.

The cause of trembles and milk sickness, E. L. MOSELEY (*Med. Rec., [N. Y.], 75 (1909), No. 20, pp. 839–844*).—The author considers trembles and milk sickness to be due to aluminum phosphate. In Ohio and Illinois animals get this substance by eating white snakeroot, in New Mexico by eating the rayless goldenrod.

"We have found considerable quantities of aluminum phosphate in the leaves of white snakeroot (*Eupatorium ageratoides*) and the stems of the rayless goldenrod (*Isocoma heterophylla*). Aluminum phosphate placed in the usual food of rabbits from day to day produces the same effects as feeding either of these weeds. The effects of feeding white snakeroot to various animals are identical with the symptoms of 'trembles.' Not only is their behavior affected in the same way, but the macroscopic and microscopic alteration of the organs are the same. Aluminum was found in the milk each day after a cow began eating the white snakeroot and this milk produced trembles in cats and rabbits. Aluminum was found in urine, kidneys, liver, and muscles of rabbits fed with white snakeroot and the meat of such rabbits, whether raw or cooked, produced trembles in cats.

"In the Northern States, wherever trembles prevails, the white snakeroot grows abundantly. We know of a number of cases of trembles following the eating of this weed by animals in the woods, and we believe that in every case of trembles investigation carefully made would show that they had eaten it. On the other hand, they may eat small amounts without serious effects. The weed grows in many places where trembles is unknown, but in these places better-tasting plants are so much more abundant that white snakeroot forms but an insignificant part of their food. Commonly in these places the white snakeroot shows no signs of browsing. Millions of animals in the Northern States are pastured where white snakeroot does not grow. We do not know of a single case of trembles ever occurring among them."

The importance of heredity in tuberculosis, J. M'FADYEAN (*Jour. Compar. Path. and Ther., 21 (1908), No. 4, pp. 332–336*).—A paper contributed to a discussion on heredity in diseases at the Royal Society of Medicine in November, 1908.

Meat as a source of infection in tuberculosis, A. R. LITTLEJOHN (*Vet. Jour., 65 (1909), No. 407, pp. 239–246*).—A paper presented at the National Tuberculosis Congress held in London, February, 1909.

The author concludes that to the community at large the risk of contracting tuberculosis by eating the meat of tuberculous animals is not so great as is generally believed, but that this risk is greater than it should be owing to inefficient methods of inspection. This imperfect inspection particularly concerns those who buy cheap meat and eat such commonly affected organs as the lungs, udder, and mesentery.

A three year campaign against bovine tuberculosis in Wisconsin, H. L. RUSSELL and C. HOFFMANN (*Wisconsin Sta. Bul. 175, pp. 3–18, figs. 4*).—This is an analysis of the bovine tuberculosis problem in Wisconsin. While an educational campaign has been conducted for the last 3 years it is stated that the mass of farmers do not fully realize the seriousness of the disease.

"Since tuberculin testing was begun in 1892 a total of 72,638 animals have been tested, 46,121 by the experiment station and 26,517 by the State veterinarian. The increase in number of tests made has been most rapid during the last two years, as in 1908 the experiment station made 27,202 tests and the State veterinarian 13,791, a total of 40,993. The State has paid to owners two-thirds the appraised value of reacting animals and has received in return whatever was received for the carcasses of these animals passed by Federal inspectors.

"The extent of infection is indicated by the tests that have been made, although they do not represent average conditions, since the more seriously infected herds were naturally tested first. There has been a decline in the percentage of animals reacting from 17.7 in 1906 to 5.6 in 1908. The serious phase of the situation is the comparatively large number of herds infected. In

1906 about 48 per cent, or almost half of the herds, were infected, while in 1908 about 24 per cent, or less than one-fourth, contained the disease. In 1906 about 12 per cent of the animals were infected and in 1908 less than 4 per cent. This indicates that the disease is present in a great many herds although it has not spread in each herd to any great extent. The evidence collected shows that the most common mode of herd infection is through the purchase of infected animals. Of 363 herds found infected in 1908, 263, or over 72 per cent, were infected through purchase."

The many tests in those counties having the largest numbers are largely due to the influence of post-mortem demonstrations, although in some cases a considerable number of tests have been secured by reason of cities passing municipal ordinances requiring the tuberculin test for all cows whose milk is sold. At the present time 14 cities of the State require such tests, although the ordinances are not yet operative in all cases. Over 25 per cent of the population of the State will be protected by ordinances of this character, if properly enforced.

The tests which have been made show that the disease is much more prevalent in the southern third of the State, where over 43 per cent of the herds, or over 10 per cent of the animals, are infected, while less than 18 per cent of the herds, or about 3 per cent of the animals, in the northern two-thirds of the State have the disease.

"Bovine tuberculosis has just begun to get a foothold in the new northern sections and steps must be taken at once if it is to be kept out. A law requiring a clean bill of health to go with each sale is badly needed as well as a law requiring the pasteurization of factory by-products. . . . By testing the herd and removing the infected animals at once and then buying only tested animals the herds can be kept free from the disease."

The control of bovine tuberculosis, J. G. Rutherford (*Ottawa: Govt., 1908, pp. 11*).—A paper read at the International Congress on Tuberculosis, held at Washington, D. C., in 1908.

Bovine tuberculosis and its eradication, W. B. De Vine (*Jour. Roy. Inst. Pub. Health, 17 (1909), No. 5, pp. 288–293*).—A paper read at the Buxton congress in 1908.

Contagious abortion in cattle (*Agr. Gaz. N. S. Wales, 20 (1909), No. 4, pp. 298–300*).—This is a brief account of contagious abortion, which is said to have been observed in Australia for some years and is now rapidly spreading throughout the coastal dairying districts of New South Wales.

Contagious abortion, S. Dodd (*Queensland Agr. Jour., 22 (1909), No. 6, pp. 317–319*).—This disease is said to exist in various parts of Queensland, although at present not to any alarming extent.

Test of Roberts's so-called anti-abortion serum (*U. S. Dept. Agr., Office Sec., Circ. 29, p. 1*).—Analysis of this preparation by the Bureau of Animal Industry shows that it is not a serum and contains no serum. The sample contained approximately 98 per cent of water, the remainder consisting of phenols (carbolic acid), oil of cloves, and a very small proportion of what appeared to be some form of vegetable matter.

Sheep scab, E. S. Good (*Kentucky Sta. Bul. 143, pp. 219–246, figs. 8*).—The number of scabby sheep going into the markets from Kentucky is said to be constantly increasing, and to such an extent as to cause this Department to consider the necessity of quarantining the State. In this bulletin the author presents information on the cause, symptoms, treatment, etc., of the disease.

From experiments made at the station as to the longevity of the parasites off the body of the host it was determined that when kept at the room temperature

of the laboratory they lived but a few days. The author advises farmers owning as many as 25 sheep to obtain good dipping vats. For smaller numbers than this scalding barrels will do. Plans are given of the dipping vat in use at the station.

The Federal regulations to prevent the spread of scabies are appended.

Disease among sheep at Yallinup, R. E. WEIR (*Jour. Dept. Agr. West. Aust., 18 (1909), No. 5, p. 365*).—A disease, in which the chief symptoms are general debility, dropsical swelling in the lower maxillary space, and weakness, particularly of the hind quarters, is reported to have been the source of a serious mortality among flocks of sheep during the past 12 months.

Veterinary section, J. H. MCNEIL and C. H. STANGE (*Iowa State Col. Agr. Rpt. 1907–8, pp. 161–166*).—This report consists of a discussion of hog cholera.

Six experiments in which the serum-alone and serum-simultaneous methods were employed are briefly described. It is stated that no animal became sick as a result of treatment nor did any untreated hog become sick while running with treated hogs except when sick untreated animals were in the same pen. From these experiments the authors draw the following conclusions:

"The serum of the blood of hogs hyperimmunized by injections of large quantities of disease-producing blood will protect susceptible hogs for a variable time against quantities of disease-producing blood sufficient to kill non-immune animals.

"The same serum will protect susceptible animals against infection during exposure to natural outbreaks of the disease such as occur on Iowa farms.

"Hogs injected with serum and virulent blood at the same time will resist the disease when exposed to natural outbreaks or artificial inoculation of disease-producing blood. Undoubtedly young pigs will acquire lasting immunity if they are treated with serum and immediately exposed to infection."

An uncommon kidney parasite of pigs (Sclerostoma pinguicola), M. HENRY (*Agr. Gaz. N. S. Wales, 20 (1909), No. 4, pp. 319, 320, figs. 3*).—A report of a case of this affection.

Canine cysticercosis, S. N. MITTER (*Vet. Jour., 65 (1909), No. 408, p. 294, pl. 1*).—The author reports a case in which post-mortem examinations revealed 13 cysts, varying in size from a large pea to a small areca nut, in the muscular substance of the heart.

Epithelioma contagiosum, W. JOWETT (*Agr. Jour. Cape Good Hope, 34 (1909), No. 3, pp. 270–276, figs. 4; Jour. Compar. Path. and Ther., 22 (1909), No. 1, pp. 22–29, figs. 5*).—This disease, also known as chicken pox, fowl pox, and sore head, is said to be very prevalent among fowls, turkeys, and pigeons in Cape Colony.

Spirochetosis in fowls due to the fowl tick (Argas persicus), H. T. PEASE (*Agr. Jour. India, 3 (1908), No. 4, pp. 309–322, pl. 1, figs. 4*).—This is a résumé of what is known of spirochetosis in fowls. The disease is said to have been frequently met with in the Punjab.

Spirochetosis of Sudanese fowls, A. BALFOUR (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 38–58, pls. 2, figs. 5*).—Following a review of the work of investigators on the subject, the author presents a brief account of his investigations.

Tuberculosis of fowls, S. F. EDWARDS (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 128–135, figs. 4*).—During 1908 19 fowls affected with tuberculosis were received. Many farmers reported that they had lost a fowl or two occasionally, and that the loss is gradually increasing, while 2 farmers stated that they had each lost about 100 within 2 years, and a third reports that he has lost one a week for over a year. Tuberculosis of birds is said to be con-

fined mostly to chickens, although other fowls may contract the disease. The post-mortem appearances of diseased fowls are described, and a table is given showing the distribution of lesions in 37 cases examined during the last 5 years. Examinations made by the author have shown the tubercle bacillus to be present in the droppings of affected fowls, and this he considers as one of the most important sources of infection. The quickest and most effective method of eradicating the disease is that of destroying all fowls and thoroughly disinfecting the premises.

White diarrhea of chicks. Roup of fowls, P. B. HADLEY (*Centbl. Bakt. [etc.], 1. Abt., Orig., 50 (1909), No. 3, pp. 348–353; Science, n. ser., 29 (1909), No. 756, pp. 1006–1008*).—This paper is based upon investigations conducted at the Rhode Island Station. The macroscopical pathological appearances in white diarrhea as observed in 427 autopsies are here summarized, and an account is given of the microscopical examinations made of smears and sections.

"The epithelium lining the duodenum, small intestines, large intestine and ceca was usually denuded to a greater or less extent. In and among the epithelial and mucus cells were many coccidia in the schizont or macrogamete stage. The thickening of the walls of ceca or intestines was apparently due both to the number of parasites, and to the proliferation of small, granular cells. The necrotic areas of the liver contained coccidia both in and out of the large liver cells. Where the coccidia were present in greatest numbers, the normal liver tissue was largely broken down and the parasites lay free in the connective tissue matrix. The nodules from the lungs revealed, upon section, areas of marked congestion and occasional necrosis. The capillaries were gorged with blood cells, and small hemorrhages were common; the pulmonary alveoli were surrounded by numerous proliferated granular cells. The epithelium of the smallest branches of the bronchi and infundibula was often broken down, and in both cubical and ciliated cells were found inclusions which possessed the appearance of coccidia. The parasitic bodies described above were, for the most part, the schizont stage of *Coccidium cuniculi*, which is also the causative agent of 'blackhead' of turkeys, and of at least some of the cases of so-called 'roup.' The schizont stage of this organism is probably identical with the *Amœba meleagridis* described by Smith (1895) [E. S. R., 7, p. 524] as the causative agent of 'blackhead' in turkeys. In the present epidemic other stages of the coccidium were also found, especially the merozoites and the macrogametes. No cysts were found in chicks under one month old. . . .

"Experiments in transmitting the disease by feeding the schizogonous stage of the coccidium, while not completed, indicate that the disease may be perpetuated in a flock without infection by means of the permanent cyst stage of the coccidium. . . .

"In reality, white diarrhea is not a disease, but a symptom. It is merely the result of a deranged metabolism, which may be caused by several factors working together or separately. One of these is coccidiosis; another may be the septicemia of Rettger, but it is probable that the disease of 'white diarrhea' as it is known to most poultrymen is primarily a form of coccidiosis. . . .

"These results show that *Bacteria septicemiæ gallinarum* has a high pathogenicity for young chicks, especially when associated with cases of coccidiosis or white diarrhea, but that it is not the only pathogenic organism accompanying coccidiosis."

The details are presented of examinations made of 6 fowls which died with the symptoms of roup. "In the cases reported no bacteriological examinations were made. It was apparent, however, that the factor of coccidiosis of the

mucus membranes was, in all cases examined, sufficient to produce, without the assistance of bacteria, nearly all the pathological conditions observed. Just as blackhead, so called, is a coccidiosis of the ceca and liver of turkeys, and as white diarrhea is a coccidiosis of the ceca, small intestines, and duodenum of young chicks, so the writer believes that many, and perhaps all, cases of the disease popularly called 'roup' are instances of coccidiosis of the mucus membranes of the head region with or without intestinal complications." A list of six references is appended.

Studies on the structure and classification of the digenetic trematodes. W. NICOLL (*Quart. Jour. Micros. Sci. [London], n. scr., 53 (1909), No. 211, pp. 391–487, pls. 2*).—In this paper an attempt has been made to allocate each of the forms dealt with to its approximate systematic place.

Piroplasmosis in the Anglo-Egyptian Sudan, A. BALFOUR (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), p. 37, pl. 1*).—Brief notes are given. Bovine piroplasmosis is said to have been probably introduced by means of a bull from Egypt. The canine form is common and the equine exists, having apparently been introduced from South Africa.

A note on the cultivation of Spirochæta duttoni, C. M. DUVAL and J. L. TODD (*Lancet [London], 1909, I, No. 12, pp. 834, 835*).—From the facts presented the authors conclude that *S. duttoni* can be maintained virulent for wild mice in artificial media for 40 days and that it will multiply and can be successfully transferred in artificial media.

Preliminary note on experiments in connection with the transmission of tick fever, W. B. LEISHMAN (*Jour. Roy. Army Med. Corps, 12 (1909), No. 2, pp. 123–134*).—From the studies here recorded the author considers it possible that natural infection by the tick bite occurs, not, as usually supposed, by the inoculation of unaltered spirochetes from the salivary glands, but through the agency of chromatin granules, which may be either regurgitated from the intestinal sac or passed in the Malpighian secretion which is voided by some ticks when engorging.

"After the ingestion by the tick of blood containing spirochetes these soon lose their motility in the intestinal sac and, eventually, their characteristic appearance. Morphological changes occur in them which result in the formation and liberation of small chromatin bodies, rod-shaped, coccoid, or curved in form. No recognizable spirochetes have been seen in any portion of a tick later than ten days after it had been fed on infected blood, nor have any been seen in the egg of a tick.

"The chromatin bodies traverse the walls of the intestinal sac and enter, or are taken up by the cells lining the Malpighian tubules; they are also to be found in quantities in the tissues of the ovary and the oviducts. Multiplication of the bodies within the tissues of the tick appears probable. Some of the bodies derived from the spirochetes penetrate into the immature eggs within the ovary and have been found in all the stages of the further development of the eggs, as well as in the earliest embryonal cells. In the embryo tick, the bodies are taken up by the cells lining the primitive Malpighian tubules and they have been found in the Malpighian tubules throughout all the subsequent stages of the tick's life. Inoculation of crushed tissue containing the chromatin bodies, but no spirochetes, has resulted in the infection of the inoculated animal when the tick from which they were obtained had been kept at a high temperature for some days before dissection."

The development of trypanosomes in tsetse flies (*Sleeping Sickness Bur. [London] Bul. 5, pp. 165–177, fig. 1*).—A review of the literature on this subject.

Mode of transmission of trypanosomes by tsetse flies (*Sleeping Sickness Bur. [London] Bul. 5, pp. 177–189*).—A review of the literature on this subject to which is appended a list of the papers consulted in this and the above accounts.

Note on the occurrence of a trypanosome (Trypanosoma cuniculi) in the rabbit, J. H. ASHWORTH and J. P. MACGOWAN (*Jour. Path. and Bact., 13 (1909), No. 4, pp. 437–442*).—*Trypanosoma cuniculi* has been comparatively seldom noticed, although it has been previously recorded from the blood of either wild or tame rabbits in Elstree (Herts), Bordeaux, Montpellier, Thomar (Portugal), and Sardinia. The authors here report the presence of this organism in tame rabbits obtained in and around Edinburgh. The health of the host is, according to the authors' observations of 5 strongly infected rabbits, not appreciably affected by the presence of large numbers of *T. cuniculi* in the blood.

The properties of serums in trypanosomiasis. Races resistant to these serums, F. MESNIL and E. BRIMONT (*Ann. Inst. Pasteur, 23 (1909), No. 2, pp. 129–154; abs. in Sleeping Sickness Bur. [London] Bul. 6, pp. 218–222*).—The history of this subject is given in some detail. The conclusions arrived at are as follows:

"The serum of animals infected with subacute, and more especially chronic trypanosomiasis, acquires specific protective properties very quickly. A mixture of this serum with trypanosomes prevents infection of mice. The appearance of these properties and their degree are independent of the course of the disease; they diminish somewhat quickly after recovery, if it occurs. This protective power is up to a certain point specific; it may help in the differentiation of trypanosomes. It resists heating from 56 to 64°. The active substances are fixed at least in part on the trypanosomes, which may then be injected into mice without effect. The active serums do not exercise in vitro any microbicidal action on the trypanosomes, even when one adds mouse serum (complement). In vivo there is seen in the peritoneum of mice which have received a mixture of trypanosomes and serum a rapid phagocytosis of the parasites, the vitality of which has been completely preserved. All the effects observed lead one to think that the serums act by making the trypanosomes capable of ingestion by phagocytes, and that they are comparable to the antibodies with alexin and sensitizing substance. One can obtain from the blood of the animals which furnish the serum trypanosomes which are refractory to these homologous serums, and which keep their properties for a good many generations measured by passage in mice (a little less than 19 for a trypanosome isolated from a he-goat, at least 19 for one obtained from a dog). The strain from the he-goat is sensitive to the dog's serum, that of the dog to the goat's serum, but with some diminution in comparison with the normal mouse strain. The strain from the he-goat, which is extremely resistant to the serum obtained at the same time, is no longer resistant to that obtained at a later bloodletting."

Trypanosomiasis in the Anglo-Egyptian Sudan, A. BALFOUR (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 27–35, pl. 1, map 1*).—Owing to the destruction by fire of nearly all of the records of trypanosomiasis work, and especially that on therapeutics carried out by the author, the report has had to be much curtailed. The work on camel trypanosomiasis is briefly reviewed. Regarding the carrier of this trypanosome (probably *Trypanosoma soudanense*) the author states that *Glossina morsitans* exists at Kawalib in the Kordofan Province, but that the fly belt is very limited and it is almost certain that some species of Tabanus, probably *Tabanus socius*, is effective. This species has been found in the districts where the disease occurs and the natives attribute the illness to its bite. It

is considered likely that this disease bears a close relation to that found in Algerian dromedaries, which is known to be transmitted by a species of Atylotus or Tabanus.

A brief account is given of trypanosomiasis of cattle and of mules. Up to the present time the following forms of animal trypanosomiasis have been found to exist in the Sudan: That of mules and horses, due to *Trypanosoma dimorphon* or *T. pecaudi*, which also seems to effect cattle and camels in one province; that of camels, possibly due to *T. soudanense;* that of cattle, due to *T. nanum;* and that of cattle, due to a new trypanosome, probably either *T. cazalboui* or *T. brucei.*

Atoxyl and its action, A. BREINL and M. NIERENSTEIN (*Ztschr. Immunitätsf. u. Expt. Ther., I, Orig., 1 (1909), pp. 620–632; abs. in Sleeping Sickness Bur. [London] Bul. 6, pp. 224–226*).—The authors' conclusions are as follows:

"Atoxyl unites in part with the serum proteids by means of the amido group. The atoxyl-serum is oxidized and arsenic set free, with combustion of the aromatic nucleus, both by means of oxidative ferments and also probably by the trypanosomes themselves. At the same time a process of reduction goes on by means of which the atoxyl is split up into arsenious acid and anilin and the anilin is excreted with the feces. The arsenic set free, in part by oxidizing, in part by reducing ferments, and also probably by the trypanosomes exercises in the nascent state its destructive influence on the parasites."

Poisoning of stock with arsenic, L. E. W. BEVAN (*Vet. Jour., 64 (1908), No. 401, pp. 557–559*).—Many cases of poisoning are said to have occurred among stock in Rhodesia during 1908.

Arsenite of soda, which is supplied in large quantities by the government for the eradication of locusts, is said to have been the form chiefly responsible for the fatalities. Cattle grazing over sprayed areas are loath to leave on account of the sweet or the brackish taste. The careless dipping or spraying in arsenic-containing dips is another frequent source of poisoning. In order to prevent drinking while in the dip, or the licking of each other while wet, aloes has been added which renders the dip unpalatable. Poisoning also results from absorption when solutions are used which contain too great a proportion of arsenic or when animals remain in the dipping tank too long. The symptoms and post-mortem lesions are described.

RURAL ENGINEERING.

Report of the State engineer to the governor of South Dakota for the years 1907–8 (*Bien. Rpt. State Engin. S. Dak., 2 (1907–8), pp. 208, figs. 6*).—During the period 1907–8, the greater part of the work of the State engineer's office was in administering the water code in regard to irrigation and water power. This work has increased steadily with the agricultural and industrial growth of the State. Attention has also been given to engineering features of irrigation, drainage, and hydrography, all of which are reported upon. The various private and public irrigation projects throughout the State are described, and their progress noted, and the status of irrigation, and the water code and its operation are discussed at some length.

In the eastern part of the State a large drainage project has been carried out from plans and investigations made by the State engineer. This and other drainage undertakings, which are stated to be rapidly increasing in number, are described.

The Wentworth irrigation area, E. HARRIS (*Agr. Gaz. N. S. Wales, 20 (1909), No. 4, pp. 267–274, figs. 8*).—This article gives the location, extent, and

kind of soil of this area, together with a brief description of the irrigating plant and the cost of preparing the land for water and cultivation.

The plant consists of a 60-horse power horizontal engine operating a centrifugal pump with a capacity of 4,000 gals. a minute, and the water is delivered into a canal the dimensions of which are, base, 2 ft., depth, 3 ft. 6 in., and side slopes 1½ : 1.

A large amount of this land is already settled, and the cost data and notes on preparing the land for cultivation, which are given, were obtained from the settlers. A map of the area accompanies the article.

Drainage [work of the Ontario Agricultural College], W. H. DAY (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 50–58*).—The work reported for 1908 included surveying and demonstrations, investigations of ditching machinery, and cement tile making.

There were 100 surveys made during the year, and progress is reported in increasing interest in drainage by this means and by demonstrations or field meetings which have been held in the localities where the surveys were made.

It is reported that ditching operations in Ontario are hindered by scarcity of labor and failure to adopt improved methods. In order to arouse interest in machine ditching an investigation was made of a traction ditching machine. The machine, which is similar to one previously described (E. S. R., 20, p. 484) is reported to operate satisfactorily and to lessen considerably the cost of trenching as compared with hand work. The machine dug on an average of 90 to 100 rods of 3-ft. trench per day in very heavy clay. The total cost was about 21 cts. a rod for 2½-ft. depth and 24½ cts. a rod when excavating to a depth of 3 ft.

In experiments in making cement tile, it was found that using a tile machine, one bag of cement and 6 cu. ft. of sand would make 75 3-in. tiles and at a rate of 525 per day of 10 hours. The total cost of making in that locality was at the rate of $9.33 per thousand.

The remainder of the report is devoted to a brief discussion of the laws regarding drainage and public funds available for drainage operations.

The King's highway, R. RYVES (*London [1908], pp. VIII+96, pls. 7, figs. 27*).—The author of this work discusses road making and improvements largely from an economic standpoint, but somewhat as to its engineering features. Of the subjects treated, the following are the most prominent: The administration and practice of road making in Europe and England and some of the more progressive States of this country; road policies, including laws regarding highways; motor traffic, and its influence on roads, as well as its economic aspect; dimensions of roads and factors affecting them; road materials; maintenance and repair; dust preventives; and the influence of the elements on the life of roads.

The systematic patching of macadamized roads, J. S. PICKERING (*Surveyor, 35 (1909), No. 903, Sup., pp. 47, 48; abs. in Engin. Rec., 59 (1909), No. 22, pp. 698, 699*).—In a paper read at a road conference recently held in England the author advocates systematic patching of roads, and points out its many advantages.

When a patch is too small to warrant the use of an ordinary steam roller the author has used a specially designed roller and water tank combined, which is completely described. The essentials of its construction are a rolling wheel 3 ft. 6 in. wide and 3 ft. 6 in. in diameter at the rear of the roller, surmounted by a 200-gal. water tank, which distributes the water through a perforated pipe. There is a box for weights, so that these and the quantity of water in the tank can be regulated to give any desired pressure on the roller.

Investigations concerning dust formation on broken stone roads, and experiments in preventing it, F. BERNHARD (*Untersuchungen über die Ursachen der Bildung des Staubes auf Steinschlagstrassen und über Versuche zur Bekämpfung desselben. Leipsic, 1908; rev. in Gsndhts. Ingen., 32 (1909), No. 21, pp. 362–364*).—This book contains the results of experiments made on the streets and roads of Carlsbad by the author, who is city engineer. In connection with the reports on studies of dust formation there are tables showing the weight of different road materials and their resistance to crushing, the wearing power of the basalt which is used as a road material there, and data on the weight of teams and amount of traffic on the streets experimented with, as well as other facts bearing on the life of the road material, including rainfall and temperature data.

The dust preventives experimented with included water, tar, calcium chlorid, magnesium chlorid, and several of the more prominent commercial preparations. The cost and efficiency of these materials in laying and preventing dust is reported upon in the book, and there is also in the review a summary of these giving briefly their composition and cost, condition of the road experimented on, and the nature and amount of traffic on it.

Experiments in dust laying, K. M. MEYER (*Ztschr. Transportw. u. Strassenbau, 26 (1909), No. 15, pp. 301, 302*).—Experiments in laying dust with ammoniacal wastes have been made in the vicinity of Berlin, and a brief description of them is given in this article. The liquid was effective in keeping down the dust and preventing its formation even in spots exposed to the direct rays of the sun, and the writer considers that there are great possibilities for these wastes, especially in municipalities owning their gas plants.

[Tests of wagon draft and axle friction], J. B. DAVIDSON (*Iowa State Col. Agr. Rpt. 1907–8, pp. 190–197*).—An account is given of dynanometer tests made at the Iowa Station to determine the draft of wagons. The results are tabulated according to kind of road surface and size of wheels and tire, with the amount of net load under different conditions of the surface as to firmness, dryness, and frost.

Tests were also made to determine the relative advantages of different types of wagon axles and bearings and the effectiveness of lubricants, and the results of these are given in tabulated form. In order to eliminate rolling friction in these tests the axle was inverted, lifted free from contact with the ground, and suspended by means of leaf springs from a rigid support. The method is described in detail. The results are considered inconclusive as regards the different brands.

Trials of manure distributers (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 173–182, figs. 4*).—There were 19 fertilizer distributers entered in these trials, and this account mentions briefly the peculiarities of each and its performance.

Descriptions are given of 2 distributers which were awarded gold and bronze medals, respectively. The first of these is stated to be unusual in construction in not having a stirring device. The bottom of the hopper is a platform moving circumferentially at a slow rate, carrying the material round to the opening, surmounted by a star or finger wheel moving in conjunction with it, which forms an effective conveyor and also serves to crush lumps against the fixed scrapers. The characteristics of the second machine are a combination force feed and revolving disc which secures a regular output and a discharge free from clogging. There are adjustable brackets so that the delivery discs can be readily tilted and the position of the discharge spouts so altered as to give equal distribution on uneven or hilly land.

The points on which the merits of the machines were judged were uniformity of distribution, efficiency of regulating output, adaptability to various materials, freedom from clogging, facilities for emptying and cleaning, economy of working, capacity of hopper, width of distribution, construction, draft, and price. The first test consisted of sowing superphosphate at the rate of 6 cwt. per acre, and the second of sowing 1 cwt. of sulphate of ammonia to the acre on ½-acre plats.

Poultry-picking machine (*Sci. Amer., 100 (1909), No. 22, p. 411, fig. 1*).—A machine for picking poultry is illustrated and described, which does not require an operator to hold the fowl against the pickers. The fowl is attached to a belt which passes through a picking chamber. The feathers are seized by combs and torn off by suction.

The Bergner-Revalo milking machine (*Deut. Landw. Presse, 36 (1909), No. 15, p. 164, figs. 5; Molk. Ztg. Berlin, 19 (1909), No. 15, pp. 147–149, figs. 5*).—This is a description of a patented milking machine recently put on the market in Germany.

Choosing a farm power, J. Evans (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 252–256*).—A brief discussion is given of the requirements of an engine adapted to farm uses and the type and power of an engine suited to various kinds of farm work.

An abridged account of the trials of agricultural motors at the Winnipeg industrial exhibition, previously noted (E. S. R., 20, p. 485), is appended.

Electroculture: A study of general conditions of the application of electricity in agriculture, P. Lecler (*Bul. Soc. Agr. France, n. ser., 41 (1909), May 15, Sup., pp. 587–600*).—This paper, which was read before the Society of Agriculturists of France, contains a study of general conditions affecting the application of electricity in agriculture. The applications in France have been few, and the author ascribes this to present economic conditions, which are discussed together with the various agricultural operations to which electricity may be applied. The cost of equipment and obtaining current is shown to be too large to make the use of electricity profitable on any but the largest projects.

Report on the modern evolution of gas-producing units and their applications in agriculture, Courquin (*Bul. Soc. Agr. France, n. ser., 41 (1909), May 15, Sup., pp. 579–586*).—This is the text of a paper read by the author before the Society of Agriculturists of France. The subject is treated from a general point of view, the object being to establish the engineering and economic principles underlying the evolution of gas-producing plants. The discussion includes methods of gas manufacture, comparisons between the different systems of producing gas, substances available as combustibles, and the extent to which producers can be applied profitably in agriculture.

Fuel from peat, M. Ekenberg (*Engineer [London], 107 (1909), No. 2787, pp. 549, 550, fig. 1*).—In this paper, read before a recent meeting of the English Iron and Steel Institute, the author gives an account of experiments and researches made with the view to obtaining a suitable process for converting peat into fuel without air drying. From studies on the question of pressing the water out of peat he found that the cause of the water not separating under pressure is the presence of a slimy hydrocellulose, which is present to the extent of 0.2 to 1.2 per cent in peat substance. It was found that this could be destroyed by heating in the presence of water to temperatures above 150° C., and a method based on this principle was devised, which is described with a diagram showing the apparatus used.

Corrosion of wire fence, L. G. Michael et al. (*Iowa State Col. Agr. Rpt. 1907–8, pp. 145–148*).—This is a preliminary report of investigations being pur-

sued by the chemical and agricultural engineering sections of the station as to the cause of the rapid corrosion of wire fencing.

Aside from the quality of the fence and the galvanizing, the knot is considered to determine the life of the fence, as it is there that the initial corrosion usually takes place.

In a discussion of the facts known regarding corrosion, it is stated that (1) corrosion is communicable by contact, new wire being corroded by having rusty iron come in contact with the galvanizing, thus facilitating chemical action; (2) the first corrosion takes place where a strand is injured and the galvanizing broken or chipped; (3) vertical wires corrode the more rapidly, rust being washed downward to the uninjured parts; and (4) lower horizontal wires are likely to be free from corrosion as well as those on posts, it is thought, because of the absence of electrolytic action, wood posts, weeds, and grass de-electrifying the wires.

Stable ventilation, J. H. GRISDALE (*Canada Expt. Farms Rpts. 1907, pp. 48–56, figs. 5*).—There is given in this report a brief general discussion of principles to be observed, followed by a description of different systems of ventilation which have been tried at the Central Experimental Farm.

The Rutherford system is reported to be in the most common use because of its simplicity of manipulation and affording the least opportunity of being wrongly operated. The essential feature of this system is an arrangement by which the fresh air enters at the floor level and leaves through a flue extending from the top of the stable to the roof.

A modification of the King system (E. S. R., 20, p. 989) also proved satisfactory. In this the pipes are all inside the building and the outlet at the ceiling level, making it easy to be installed in buildings already built.

Experiments were also made in ventilating a stable by covering the windows with muslin. With the outside temperature varying from 36 to 2° F., the inside temperature varied from 62 to 36°. This method was not found to be satisfactory because of the great variation in temperature even with careful watchfulness, the darkening of the stable making it gloomy and damp, and the fouling of the muslin making it muddy in appearance and unsanitary in condition.

Muslin curtain ventilation v. Massey system and King system, W. H. DAY (*Ann. Rpt. Ontario Agr. Col. and Expt. Farm, 34 (1908), pp. 58–64*).—This investigation was undertaken for thesis work by students of the college.

In the Massey system, which was already installed in the farm stable, fresh air is admitted at the floor level, while the foul air is drawn from the ceiling. The King system (E. S. R., 20, p. 989) was in use in the dairy stable. In both of these buildings muslin curtains were installed and observations were taken, using each system independently. During the experiments determinations were made of the quantity of carbon dioxid, humidity, temperature, and wind velocity. The results are given in tabular form.

The conclusions arrived at were that the muslin curtain system as compared with either the Massey or King systems is unreliable and inferior. This is in confirmation of the results obtained by Grisdale as noted above. It was shown that with the muslin curtain system irregular distributions of carbon dioxid and of moisture occurred and that more of both were present than with the other systems.

Plans of farm buildings (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 241–273, pls. 4*).—A competition was held in 1908 by the Royal Agricultural Society of England for plans of farm buildings suitable for a tenant farmer on a mixed farm of from 300 to 400 acres. The farm was assumed to be half grass and half arable, the grass land being suitable for the production of milk and the arable land regarded as used for turnips or barley.

The following points were specially considered in judging: (1) Economy in planning, cost of construction, and subsequent maintenance; (2) convenience of arrangements for working and accommodations for animals; (3) lighting, ventilation, and drainage of sheds, especially of those for dairy cattle. In addition to these points, the estimated cost of the buildings was taken into consideration, and the 4 prizes were awarded to those plans which could be carried out at less than $40 an acre.

The plans which were awarded prizes are given, together with the detailed reports, specifications, and estimates accompanying them.

Radford's combined house and barn plan book, W. A. RADFORD (*New York and Chicago, 1908, pp. 287, figs. 98, dgms. 296*).—The designs given in this book are for the use of builders in rural communities. The first part of the book contains perspective views and floor plans of over 100 moderate and low priced houses. The remainder is devoted to illustrations and plans for barns and other farm buildings, such as feed lots, cattle sheds, poultry houses, ice and cold-storage houses, implement sheds, corn cribs, silos, granaries, etc., and includes suggestions as to the materials, methods of construction, and arrangement of the interiors.

RURAL ECONOMICS.

[Papers relating to rural economics], J. G. BROOKS ET AL. (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 794–796, 807, 808*).—Abstracts are given of the following papers read at the Dublin meeting of the British Association for the Advancement of Science in September, 1908 (E. S. R., 20, p. 298): Social Aspects of Agricultural Cooperation, The Psychological Aspect of Agrarian Reform in Ireland; The Productivity of English Agriculturists; and Small Holdings—Some Considerations on their Successful Establishment.

Science and the problem of rural life, H. PLUNKETT (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 796–804*).—This is an address delivered before the Dublin meeting of the British Association for the Advancement of Science, previously noted (E. S. R., 20, p. 298).

First general assembly of the International Institute of Agriculture (*Institut International D'Agriculture. Assemblée Générale. Rome, 1908, pp. 172*).—This contains the list of delegates, rules and regulations, and the report of the proceedings from November 27 to December 1, 1908.

Value of farm lands East and West, H. C. PRICE (*Amer. Agr., 83 (1909), No. 26, p. 727*).—The relative values of eastern and western farm lands are compared and the economic advantages of eastern farm lands as to fertility, markets, and transportation facilities are emphasized.

List of farms occupied and unoccupied for sale or rent in New York State, R. R. RIDDELL (*N. Y. Dept. Agr., Bur. Statis. Farm Bul. 4, pp. 165, pls. 14, map 1*).—This is a detailed list of such farms arranged alphabetically by counties. The different farms are described as to size, location as to markets and transportation facilities, character of farm lands, house and barn accommodations, price, owner, terms of rent or sale, etc.

Rural depopulation and scarcity of labor, H. VON KNEBEL DOEBERITZ (*Ztschr. Agrarpolitik, 7 (1909), No. 5, pp. 244–250*).—This article summarizes the views of various authors who have considered the agrarian problem in Germany from different points of view, criticises the positions taken as offering no satisfactory solution of the problem, and suggests as a means of preventing rural depopulation and a lack of farm laborers a change in the emigration laws and the establishment of farms for laborers.

Japanese farmers and farm hands (*Mo. Cons. and Trade Rpts.* [*U. S.*], *1909, No. 344, pp. 218, 219.*)—Notes are given on the economic conditions of farming and farm life in Japan.

In the renting of farms the European metayer system prevails, the farmer paying half the value of the crops as rent. The wages of farm labor are low, but not so in comparison with the general standard of living. Taking this into consideration, the Japanese farmer and farm laborer are as well off and contented as farmers in other parts of the world.

The holdings and products of agricultural laborers in Bavaria, A. ROITZSCH (*Illus. Landw. Ztg., 29 (1909), Nos. 44, pp. 429, 430; 45, pp. 437, 438*).—This article presents and discusses statistics derived from the Bavarian census of 1907 regarding the number, size, character, management and crop production of different size small holdings, and the number and classes of agricultural workers in 1907 as compared with similar data for 1895. The article discloses the changes which have taken place in the landholding and landless classes of rural workers and its effects on farm management and agricultural production.

Agricultural mutual insurance against accidents, LABERGÉRIE (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 4, pp. 378–387*).—This paper briefly describes the development of mutual agricultural insurance societies in France from a few societies in 1898 to more than 8,780 in 1908, sets forth the legal difficulties in the way of farm laborers securing compensation for injuries from their employers and the high rates charged by regular insurance societies for agricultural risks, and gives the principal regulations of a recently organized agricultural mutual insurance society. The features of this organization deemed worthy of special mention are the extreme flexibility of its rules, the ease with which they can be extended to all forms of agricultural labor, the protection of landowners renting under the share system, and the payment of directors and agents on a percentage basis.

Agricultural credit banks (*Bd. Agr. and Fisheries* [*London*], *Leaflet 214, pp. 4*).—This pamphlet points out the need of credit among farmers and discusses the distinctive features, objects, organization, and operation of credit banks.

Agricultural warrants, CASTELIN (*Bul. Soc. Agr. France, n. ser., 41 (1909), June 1, Sup., pp. 720–724*).—The author outlines the kinds of agricultural wealth that can be pledged as a means of securing credit in France and other countries, shows how little use is made of credit by farmers in France in view of the great wealth-producing power of the industry, and makes a plea for an extension of agricultural credit as a means of increasing wealth production, thereby making it possible to increase the price of wages while reducing the cost of products to consumers.

The national association of German agricultural cooperative societies in 1908 (*Ztschr. Landw. Kammer Braunschweig, 78 (1909), Nos. 11, pp. 127–129; 12, pp. 137–139*).—At the close of 1908 the societies numbered 22,317, a gain of 1,008 during the year. The numbers of the different societies were as follows: Credit societies 14,834; societies for the purchase and sale of supplies 2,152; creameries 3,184; and miscellaneous 2,147. See also a previous note (E. S. R., 20, p. 990). Statistics of the business conducted by the different societies are presented and discussed.

Law authorizing loans to agricultural cooperative societies in Algeria (*Bul. Statis. Lég. Compar., 33 (1909), No. 3, pp. 251–253*).—The text of the law of February 26, 1909, amending the law of July 8, 1901, and setting forth the conditions under which the Algerian agricultural cooperative societies may secure the loan of government funds for the promotion of their different lines of cooperative undertakings, is reported.

The cooperative elevator, G. C. STREETER (*Farm and Fireside, 32 (1909), No. 18, pp. 1, 4, fig. 1*).—The author describes the development of grain cooperative associations in Illinois and Iowa, and the methods employed by old-line elevator companies to prevent their successful operation. According to statistics there were on March 4, 1909, no less than 250 farmers' cooperative elevators in Illinois.

Robbing the hand that feeds, F. CRISSEY (*Everybody's Mag., 20 (1909), No. 6, pp. 761–771, figs. 8*).—A popular article dealing with the methods practiced by commercial middlemen for depriving growers and shippers of agricultural produce of just prices for their products. Cooperation among farmers is advocated as a remedy for such conditions.

Bookkeeping for farmers, W. MCIVER (*Jour. Dept. Agr. Victoria, 7 (1909), No. 5, pp. 305–312*).—A simple system of bookkeeping for farmers is described and illustrated.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 7, pp. 41–48*).—Statistical data are given on the condition of crops in the United States and foreign countries, the farm values of important products, and the range of prices of agricultural products in the chief markets of the United States.

AGRICULTURAL EDUCATION.

The American system of agricultural education, A. C. TRUE and D. J. CROSBY (*U. S. Dept. Agr., Office Expt. Stas. Circ. 83, pp. 27, pls. 9*).—A semipopular discussion of the leading features of American agricultural education in elementary, secondary, collegiate, and graduate courses, with a description of typical institutions and agencies for conducting them. The educational functions of this Department, as exercised through this Office, are particularly explained.

The school of agriculture on the university farm, Davis, California (*California Sta. Circ. 41, pp. 3–6, figs. 5, dgm. 1*).—This circular answers questions such as a boy might ask regarding the school, the conditions of entering, course of study, etc.

Proceedings of the twenty-second annual convention of the Association of American Agricultural Colleges and Experiment Stations, held at Washington, D. C., November 18–20, 1908, edited by A. C. TRUE, W. H. BEAL, and H. C. WHITE (*U. S. Dept. Agr., Office Expt. Stas. Bul. 212, pp. 122*).—An account of this convention has been given (E. S. R., 20, p. 406).

Industrial and vocational training in the public schools, E. C. WARRINER (*Mich. State Supt. Pub. Instr. Bul. 2, 1909, pp. 10*).—This bulletin was prepared as a contribution to the literature of vocational training. The author briefly reviews the legislation which has resulted in the establishment of special trades schools in Massachusetts and New York, and in the cities of Philadelphia, Portland (Oreg.), Milwaukee, and Columbus (Ga.), and discusses the work carried on in these schools.

Recent tendencies toward industrial education in Europe and America, C. B. GIBSON (*South. Ed. Rev., 6 (1909), No. 1–2, pp. 275–284*).—This article is a discussion of the present situation in reference to industrial education abroad and at home.

The essential requirements of negro education, J. H. PHILLIPS (*South. Ed. Rev., 6 (1909), No. 1–2, pp. 294–302*).—The author of this article believes that in direct consequence of the racial psychology of the negro child his education should begin early, in the kindergarten and nursery schools, in anticipation of the period of early arrest in mental development. The matter and method

of instruction should be concrete and objective. Throughout the elementary school the emphasis should be placed on industrial training. Lessons in hygiene and home sanitation should be given in every grade. Girls should be trained in the several forms of domestic art and boys in the elements of agriculture, stock-raising, gardening, and the use of tools. The methods of Hampton and Tuskegee should be extended downwards. Secondary industrial schools should provide advanced instruction in the industrial arts, including English and the advanced academic branches for those preparing to teach. The author believes that "the principle of race identity" requires that at least in the lower schools the teachers should be negroes, and that the incentive of becoming the teacher of his race should not be withheld from the negro student.

California State farmers' institute at the university farm, Davis, October 8, 9, and 10, 1908 (*California Sta. Circ. 40, pp. 4*).—This contains the program of the second institute held at the university farm at Davis.

Annual report to institute members (*Agr. Ed. [Kans. Agr. Col.], Farmers' Inst. Ser. 1, (1909), No. 6, pp. 27, figs. 5*).—This number contains information concerning all lines of agricultural extension work planned for the current year. It includes an account of the legislation concerning farmers' institutes and farm demonstration in the State, suggestions in regard to boys' and girls' club contests, monthly meetings of the county institute organizations, a reading course for farmers, and general notes on institute work. The membership reached in the reading course is estimated at 40,000.

Farmers' institute bulletin, 1907 and 1908, E. R. Lloyd (*Mississippi Sta. Bul. 120, pp. 89, figs. 7*).—A tabular summary of the farmers' institute work in Mississippi for 1906, 1907, and 1908, is followed by some of the principal addresses given at these institutes on such subjects as growing cotton under boll weevil conditions, alfalfa, vetches, pork production, beef production, drainage, diversification, truck farming, and farm forestry.

Proceedings of the thirteenth annual meeting of the American Association of Farmers' Institute Workers, edited by W. H. Beal and J. Hamilton (*U. S. Dept. Agr., Office Expt. Stas. Bul. 213, pp. 73*).—This is a detailed account of the proceedings of the meeting held at Washington, D. C., November 16–17, 1908, which has been previously noted (E. S. R., 20, p. 398).

MISCELLANEOUS.

Twentieth Annual Report of Colorado Station, 1907 (*Colorado Sta. Rpt. 1907, pp. 52*).—This contains the organization list, a report of the director discussing the function, work, and needs of the station, departmental reports, of which a portion of that of the agriculturist is abstracted on page 371 of this issue, a financial statement for the fiscal year ended June 30, 1907, and a list of bulletins issued during 1907.

Twenty-first Annual Report of Colorado Station, 1908 (*Colorado Sta. Rpt. 1908, pp. 15–30, 99–148*).—This contains data corresponding to the above for the fiscal year ended June 30, 1908, and in addition a list of the exchanges received during 1908. The report of the field entomologist is abstracted on page 352 of this issue.

Annual Report of Florida Station, 1908 (*Florida Sta. Rpt. 1908, pp. CXXX+XV*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1908, a list of the publications of the year, a general review of the work of the station during the year, departmental reports, and a list of the periodicals received by the station. Most of the experimental work

reported is abstracted elsewhere in this issue. The report of the animal industrialist contains data as to the relative dressed and live weights and percentages of 27 Florida native and grade cattle.

Biennial Report of Iowa Station, 1907–8 (*Iowa State Col. Agr. Rpt. 1907–8, pp. 135–217*).—This contains a report of the director, departmental reports, and a financial statement for the fiscal years ended June 30, 1907, and June 30, 1908. The experimental work reported is for the most part abstracted elsewhere in this issue.

Nineteenth Annual Report of Kentucky Station, 1906 (*Kentucky Sta. Rpt. 1906, pp. XIII+286*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1906, a report of the director on the work of the station during the year, reprints of Bulletins 124–128, previously noted, and reports of miscellaneous analyses and meteorological data abstracted elsewhere in this issue.

Twentieth Annual Report of Kentucky Station, 1907 (*Kentucky Sta. Rpt. 1907, pp. XXIX+215*).—This contains data corresponding to the above for the fiscal year ended June 30, 1907, and in addition reports by the director on the food and feeding stuffs control. Bulletins 127–132, previously noted, are reprinted. The reports of miscellaneous analyses and meteorological data are abstracted elsewhere in this issue.

Twenty-first Report of Canada Experimental Farms, 1907 (*Canada Expt. Farms Rpts. 1907, pp. 414*).—This contains, in addition to departmental reports for the most part abstracted elsewhere in this issue, meteorological observations, lists of publications issued, plans of the new horse and cattle barns, individual records of the dairy herd, analyses of saline deposits, asphaltum, and strychnin, a discussion of white diarrhea in chicks, and feeding trials with steers and pigs.

Ohio Station Circulars 1–50 [reprints] (*Ohio Sta. Circs. 1–50, pp. 123*).—This reprint is issued to complete files of the station circulars, the earlier numbers of which were chiefly issued for temporary purposes, and not generally distributed. Circulars 1–41 have not been previously noted.

NOTES.

Connecticut State Station.—The legislature has made an appropriation of $30,000 for a fireproof addition to the station laboratories.

Idaho University and Station.—J. R. Shinn, horticulturist, and R. E. Hyslop, agronomist, are no longer connected with the university or station. O. M. Osborne, a recent graduate of the University of Wisconsin, has been appointed instructor in agriculture and assistant to the dean.

Kansas College and Station.—F. G. King, formerly of the Missouri University and Station and the Missouri State Board of Agriculture, has been appointed assistant animal husbandman, vice G. C. Wheeler, whose transfer to extension work has been previously noted, and entered upon his duties September 1. Other appointments include T. G. Patterson as assistant in animal husbandry in the college and Turner R. H. Wright as assistant in animal nutrition in the station, both of these appointments becoming effective September 1; and A. Miyawaki, who became assistant in dairying in the station July 1.

Massachusetts College and Station.—The resignation is noted of R. D. MacLaurin as lecturer in organic chemistry in the college and research assistant chemist in the station, this becoming effective September 1.

Missouri University and Station.—F. B. Mumford, animal husbandman, has been appointed dean of the college of agriculture and director of the station. Other appointments include the following assistants: Homer E. McNatt, dairying; C. T. Dearing, horticulture; C. A. Schwartze, botany; J. B. Latshawe, veterinary science, and A. A. Jones, agricultural chemistry.

Montana College and Station.—H. P. Griffin, a 1909 graduate of the Missouri University, has been appointed assistant in animal industry and has entered upon his duties. H. F. Patterson, a graduate of the Iowa College, has been appointed assistant in agronomy, beginning September 1.

Nebraska University and Station.—Frederick H. Abbott resigned as regent of the university July 8 to become United States Assistant Commissioner of Indian Affairs, and has been succeeded by Harvey E. Newbranch, of Omaha. R. E. Stone resigned August 1 as assistant professor of agricultural botany in the university and assistant in agricultural botany in the station.

New Hampshire College and Station.—F. W. Morse, chemist, retired from the college and station work September 1. I. M. Lewis, instructor in botany in the college and assistant botanist in the station, has resigned to become instructor in botany at the University of Texas. W. H. Wicks, assistant horticulturist, has resigned to accept a position at the Idaho Station. W. C. O'Kane, who received the M. S. degree at the Ohio University in June, has been appointed assistant entomologist in the station.

An excursion of the granges of the State and the summer meeting of the State Horticultural Society were held at the college August 12. About three thousand were in attendance, this being probably the largest agricultural gathering ever held in the State. A very marked increase of interest in the work of the college and station is reported.

Virginia College and Station.—Dr. N. S. Mayo, for the past five years chief of the department of animal industry of the Cuban Station, has been appointed animal husbandman and veterinarian, and entered upon his duties September 1.

EXPERIMENT STATION RECORD.

Editor: E. W. ALLEN, Ph. D., *Assistant Director.*
Assistant Editor: H. L. KNIGHT.

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Field Crops—J. I. SCHULTE.
Horticulture and Forestry—E. J. GLASSON.
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Rural Engineering—G. A. GRIFFIN.
Rural Economics—J. B. MORMAN.
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NOTE.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the State experiment stations are distributed from the stations and not from the Department.

EXPERIMENT STATION RECORD.

VOL. XXI. OCTOBER, 1909. No. 5.

Investigation in horticulture was the main topic of consideration at the recent meeting of the Society of Horticultural Science. The need of it was the keynote of the meeting, and there was frank admission on the part of many that little more than a beginning has yet been made. It was made clear that in organization for teaching and for experimentation horticulture has not kept pace with the advancement of the times, and that this fact has restricted its efficiency in both directions.

Horticulture as a separate subject was one of the first to be organized in the agricultural colleges. It was recognized as one of the grand divisions of agricultural education, and in point of equipment was developed quite as early as agriculture. It was popular, and the practical usefulness of its courses was realized early in the history of these institutions. It was looked upon as a department unto itself, and the distinctions between it and other departments of instruction were carefully guarded.

Horticultural instruction in this country has had a higher aim than that in Europe. The English and continental gardeners are largely men of the apprentice-school type, whose training has been centered on learning to do things—on developing skill and good judgment. The object of the agricultural colleges of this country is to make educated men, as well as men with practical training. The effort in horticulture has been to teach not only the art but the principles, so far as they are known, and to reduce horticulture to a pedagogic basis. But in this the subject has not kept pace with other branches of agriculture of late. The attempt to hold it intact and to itself has retarded the development of its organization, and prevented its keeping pace with the differentiation and specialization which have been going on in agriculture. The mode of organization has now become traditional and unsuited to present conditions. The units are far too large, and do not develop specialization either in teachers or students.

Horticulture is at present a highly developed art. The art has developed far beyond the understanding of the science, and skill

drawn from experience is depended upon rather than a knowledge of principles. The work of horticulturists has dealt largely with the art—with the commercial and æsthetic side of the subject. This has predominated to such a degree as often, and perhaps usually, to give the student an imperfect conception of the field and a biased view as to the needs on the experimental side.

At no stage has there been the attempt to correlate horticultural practice and problems with the sciences that there has been in some branches of agriculture proper. The fundamentals of horticulture have not been sufficiently developed to meet the demands of scientific training, and graduate work in that subject has not been so arranged as to promote investigation except in a quite limited way.

The science has been to a large degree borrowed from the related sciences, and systematic investigation in the science of horticulture by horticulturists has been prosecuted only sparingly. They have been too busy with the practical questions and often in conducting large plantations on a commercial basis. In their teaching and their experimental work they have spread themselves over too broad a field. Their work has been diffuse, and there have been few who have been content to confine themselves to a definite field. This has necessarily made much of the work superficial; and the success met with in assisting practical men has tended to engender a certain satisfaction with that kind of work, and prevented full realization of the need of more fundamental investigation.

Horticulture as a science has not yet been organized, and the field of horticultural investigation has not yet been surveyed and mapped. Only quite recently has much consideration been given to the science of horticulture and its upbuilding. It presents a virgin field.

The meeting of the society at St. Catharines, Ontario, was therefore a noteworthy one in the prominence given to this subject. In this respect it was a realization of what was expected when the society was organized under its present name several years ago. As a mark of its interest in the subject, the society rejected a proposition to change its name to that of an Association of Official Horticulturists; the sentiment prevailed that the body should retain the name and the character of a society of science as related to horticulture. As such it has a wholly unoccupied field, and may become a very important agency for the advancement of horticultural science and the reorganization of horticulture in the agricultural colleges and experiment stations.

In the presidential address, Mr. W. A. Taylor, of this Department, voiced the great and increasing need for science in horticulture. This must be developed out of thoroughgoing research, fundamental in character and method, and aimed primarily at principles and laws

rather than at practical rules. The need of well-trained, well-poised men to conduct such work was strongly emphasized, for it was recognized that without men with the proper training and the proper outlook, little real advancement in horticultural science can be looked for. Men first, and then the development of methods of research in horticulture, were looked upon as the two things most needful for horticultural investigation.

In a paper on The Adams Fund in Its Relation to Investigation in Horticulture, E. W. Allen, of this Office, described the work which is being done in horticulture under that fund, and pointed out some of the essential features of investigation. The review showed that the Adams fund has stimulated a considerable amount of investigation in the field of horticulture, and that this covers a quite wide range. Of the forty-five projects in that field, however, only a part are being conducted by horticulturists, the remainder being in charge of men in other departments.

This illustrates the intimate relationship between horticulture and the basic sciences, and the necessity of taking account of the investigation done there in determining the present status of science in horticulture. The horticulturist entering the field of investigation requires a quite broad view of science. This familiarity must teach him the field of these sciences, and in a general way what has already been done. He must know not only the methods and the spirit of science, but he must be able to think clearly in science. He must be able to analyze the large practical problems in his subject, and resolve them into their scientific aspects, so as to define his investigation, get a point of attack, and give the work direction.

There is much advantage to be gained from the point of view of the horticulturist, provided there is combined with it a broad scientific outlook and sympathy. The man with practical sympathies and an understanding of the conditions of the art should be in position to turn out more efficient and useful investigation in horticulture than one whose studies take no account of these considerations.

But the horticulturists too often approach their problem from the standpoint of the art primarily, rather than that of science, and as a result the experimental work in that field has consisted quite largely of trials and experiments which gave only a superficial answer and are not conclusive or permanent in character. Up to the present time there has not been a very widespread or well-defined sentiment for research under existing conditions. The horticulturists have felt the pressure to get results of immediate practical application by the shortest route. The needs of the art have appealed to them strongly, and the commercial and practical aspects of the subject have been alluring and fascinating.

In a general way there has been agreement among horticulturists that there ought to be more investigation in their subject, and a recognition that it is based on the application of principles in science which ought to be worked out. The demands upon them prevented such work in the earlier stages, and this has gradually shaped their attitude toward experimentation in horticulture until, in a way, it has become fixed, so that although the way now opens for research they are not drawn to it. They have not had the inspiration of investigation by foreign horticulturists, or an organization of the field, or a summing up of the status of knowledge from a scientific standpoint.

Twenty years of experiment station work has changed the view but little. The work has been mostly in circles and has continued largely along beaten paths. Investigation is largely a matter of sympathies and temperament, and these have not been developed. The call is loud and insistent for men of that training, but the demand can not be met. The difficulty gets back to the colleges. They are not holding up the ideals to the occasional student suited to that sort of a career, and developing in him the standards for real progressive work in horticulture, the spirit of research, and the point of view of science as well as of commercialism. Until this is done, until horticultural instruction is put upon a higher plane, and the possibilities for advanced work in science with a horticultural outlook are developed, we shall have to draw largely on the basic sciences for the principles of horticulture.

More attention needs to be paid to what the basic sciences are contributing which has a bearing on horticulture, and it would be a great help to have the scientific basis of horticulture gathered from all sources and arranged in a systematic way. The knowledge of what has been done is a prerequisite to original investigation in any line.

It is a singular fact that we have no text-book or treatise on horticulture in its scientific aspects, no book which brings together for the teacher or the student what is really known of the principles which underlie operations in horticulture. We have such books for animal nutrition, for breeding, for agricultural chemistry, for soils, and other branches of agriculture, but not for horticulture. We have, it is true, books on the principles of fruit culture and of vegetable growing and the like, but they are the principles or elements of practice, not of science.

What a help such a book would be to both the teacher and the investigator! It would give the status of science in horticulture in such a way as to furnish a starting point for original and productive

investigation, and something to build onto. There would be no further excuse for working around in circles. Such a treatise would illustrate the meaning of investigation, and open up a vast number of subjects for study. It would help greatly in organizing the subject, and aid in formulating the practical problems in their scientific aspects.

The preparation of such a manual would prepare the way for a classification of horticulture from a scientific standpoint. It would furnish a basis for horticultural science, and would in fact be the beginning of that science. Science as applied to any subject is knowledge verified and arranged in an orderly system, and the office of science is the study of the sequence of phenomena. This, then, is the office of horticultural science—to bring together scientific knowledge as it relates to that subject and arrange it in an orderly system, and to study the sequence of phenomena in horticulture.

The paper by Prof. L. H. Bailey, on The Field of Research in Horticulture, was a definition of the kind of work needed to develop the fundamentals of horticulture, the kind of men required to carry on such work, and the need for reorganization. It was a frank setting forth of the manner in which horticulture as a subject is lagging behind, both in teaching and investigation.

Professor Bailey explained that the practices of the present day have grown up in a sort of haphazard and indefinite way. They are in large measure founded on shrewd guesses. Because they have served us very well so far there is no reason to expect them to continue to meet our needs. "Research in horticulture is as much to be furthered as is research in anything else. . . . There really can be no worthwhile horticulture unless it be founded on original scientific investigation."

The definition given of research was clear and explicit. It was characterized as "a competent effort by a competent person to discover principles and facts that are underlying in one year as well as in another, and that do not grow old and out of date, in distinction from the making of tests and the reelaboration of present knowledge."

Citing an illustration from horticulture of this distinction he said: "To determine what varieties of apricots are best adapted to a region may be one of the most useful undertakings, but it is of temporary value and a new test should be made every five or ten years. To describe the varieties of apricots is of the same order. If, however, one were to inquire for the principles that control the variation of apricots, or that determine the limitations of varieties, or that underlie the physiological processes in apricot growing, or that explain the

close interrelation of the apricot flora with climate, he would be entering the field of real research."

Research depends on the intention and method of the work, and specially on the capacity of the man who undertakes it. Its intention is to go to the bottom. It requires a research type of mind; "few persons are capable of projecting and completing real investigational work," hence men must be selected who have the special aptitude and qualification for it. It is futile to attempt to exact it of all men.

Professor Bailey expressed the belief that on the research side the horticulturists in the colleges and stations are not making great headway, and that few new men are being turned out who promise to meet the coming problems. The reason for this condition was assigned very largely to improper or inefficient organization and plan. "Horticulturists are forced to cover too much ground," he said, "and necessarily they cover some of it very thin. The work is not sufficiently specialized. There is the same need that horticulturists become particularists as that other college officers become unquestioned authorities in particular subjects. . . . If the subjects that we class with horticulture had been wholly unrecognized until this time, it is inconceivable that they would now be organized under the present form."

He urged differentiation in function and specialization in horticulture, and pointed out that the horticulturists should themselves be actively preparing a reconstructive movement.

In regard to the kind of men needed for the college and station work, Professor Bailey laid great stress on the development of the point of view and the scientific spirit, and upon the necessity for graduate work. In this he drew upon his address given before the Association of American Agricultural Colleges and Experiment Stations, at Portland, the past summer. He urged that the colleges must not only train farmers but must train the trainers of farmers; they thus have a double work to perform. "The college that makes no adequate distinction between these two lines of service ought not to undertake to train men for the best leadership, or to expect that even the best men from the graduating classes will be fitted for it."

The point was made that the college that trains a man inoculates the spirit into him. "No person is prepared for college and station work who does not possess the scientific spirit. . . . The point of view is the first consideration; the curriculum is one of the means of working it out." The type of mind determines the man's attitude toward a problem. "The attitude of the young man toward his work is just as important as the work itself; and for this attitude his instructors are in large degree responsible."

"Because a man has graduated from a college of agriculture it does not follow that he is fitted for a position in a college of agriculture.

My contention is that we have now come to the time when we must more closely scrutinize the men who are to officer our colleges of agriculture and our experiment stations. We have now skimmed the surface in agricultural investigation, taking off the apparent and the easy subjects. The constituency is rapidly rising in intelligent appreciation of what we do. We must now go deeper, attack the essential underlying problems, teach more fundamentally."

Professor Bailey urged strongly the importance of postgraduate study to prepare men for service in the colleges and stations. Such study he considered essential to efficient service at the present stage. He pointed out that practically all the postgraduate students of to-day will be candidates for positions as teachers and experimenters. It is important, therefore, that only men suited to it be encouraged to enter upon such graduate work, and that we appreciate the value of the time element in training persons for college and station work. They should be allowed to mature and ripen.

These are important considerations. They are fundamental to progress. There has been no cessation in the demand for men for our colleges and stations. The supply has not kept pace with it, and men have been pressed into the service who were never intended for it. The demand is especially for men of advanced training, men ripened by postgraduate study, and with a broad insight into science and its methods and its spirit.

This is true of horticulture as well as elsewhere, but the supply is exceedingly small. The opportunity is here but not the men to meet it. The need for investigation lies in its relations to both the art and to teaching. The more transitory tests and experiments have been extremely useful, although half-way knowledge is uncertain and likely to be misleading. Horticulture is largely intensive, and mistakes are serious. As Professor Bailey said, "a special obligation of good and careful investigation rests on all those who study any of the practices whereby men and women wrest their livelihood in the world." From the standpoint of the teacher the present need for investigation is even more imperative, if horticultural instruction is to keep pace pedagogically with that in other branches of agriculture, based on investigation in which the horticulturists themselves take an active part.

There has seemed sometimes to be a disinclination among horticulturists to map out a restricted field and settle down to investigation in it. In a number of instances men are now employed primarily for investigation, and the attempt is made to relieve them of every disturbing or distracting feature, and to leave them to their quest. Some of these men unfortunately fail to meet the requirements,

because they can not resist the fascination of horticulture as an art and a business, and the practical questions which it suggests.

The commercial possibilities are disconcerting to some well-prepared men. Too often they are drawn by the attraction of making money, rather than by that of adding new facts to the fund of human knowledge and thus becoming one of the civilizing agencies of their day. The commercial spirit dominates the scientific, and they become restless and dissatisfied. We can never have investigation in horticulture, under the direction of horticulturists, until we have a class of men with the investigative turn of mind, the training which prepares for it, and the taste which makes its pursuit and its associations satisfying.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY.

On the quantitative determination of nitric acid, A. Gutbier (*Chem. Ztg., 33 (1909), No 18, p. 158; abs. in Chem. Zentbl., 1909, I, No. 13, p. 1114*).—Referring to a recent article by Hes (E. S. R., 20, p. 1104), the author reiterates conclusions expressed in a previous article (E. S. R., 17, p. 112). The use of filter paper dried at 110° C. for collecting the precipitate as proposed by Hes is condemned.

The determination of nitrates by the Grandval and Lajoux method, L. Farcy (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 10, pp. 562, 563*).—Attention is called to the fact that the author is covering in his investigations much the same ground as Lombard and Lafore (E. S. R., 21, p. 8).

Influence of bromids and iodids on the determination of nitrates in water, L. Farcy (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 10, pp. 563–566, fig. 1*).—Investigations are reported from which the author concludes that the halogen salts have a disturbing influence in the application of Grandval and Lajoux's method for the determination of nitrates in waters, the coefficient of decoloration varying with the kind of halogen salt present. Iodids stand intermediate between chlorids and bromids. The mechanism of the reaction is evidently the same for the three classes of halogen salts.

On the determination of osmotic pressure, J. König and J. Hasenbäumer (*Ztschr. Angew. Chem., 22 (1909), Nos. 22, pp. 1009–1018, figs. 2; 23, pp. 1070–1074*).—The method proposed as well as a new form of osmometer are described in detail, with results of numerous tests of the method. See also a previous note (E. S. R., 20, p. 713).

The use of the histological method for the microscopical determination of colloids, particularly in soil investigation, F. Cornu (*Ztschr. Chem. u. Indus. Kolloide, 4 (1909), No. 6, pp. 304, 305*).—The possibility and advantage of using such methods are briefly pointed out.

Studies on the determination of clay in soils, E. Arntz (*Landw. Vers. Stat., 70 (1909), No. 3–4, pp. 269–306; abs. in Chem. Abs., 3 (1909), No. 13, pp. 1565, 1566*).—As a result of an extended series of studies of methods, the author proposes the following procedure:

"Heat 5 gm. of fine soil with about 50 cc. of water and 2 cc. of 10 per cent hydrochloric acid (with soils containing larger amounts of lime the hydrochloric acid should be correspondingly increased), remove the solution by filtration, wash the soil, and remove to a 300 cc. beaker. Add 30 cc. of 18 to 20 per cent ammonia, boil gently for ½ hour, keeping the beaker covered with a watch glass, cool, add water to a depth of 11 cm. over the soil, and after 24 hours' standing, siphon off the supernatant solution to a depth of 1 cm. Remove the residue to a porcelain dish, stir up repeatedly with a little water, and decant until a clear solution is obtained. Remove the residue and the solutions to a beaker and boil gently for ¼ hour in 20 cc. of ammonia. Cool, cover with water to a depth of 11 cm., and siphon off after 24 hours, repeating this opera-

tion three times. Precipitate the clay in the solution by means of ammonium chlorid. Collect this clay with the iron and alumina precipitated from the original hydrochloric acid solution on a filter, wash, ignite, and weigh. With soils having a clay content of 1–15 per cent, divide the weight obtained by 0.99, with those containing 15–30 per cent by 0.98, and with those containing 30–50 per cent by 0.97."

The calculation of the potash content of potassic rocks from the specific gravity, C. PRZIBYLLA (*Kali, 1909, pp. 117, 118; abs. in Chem. Ztg., 33 (1909), No. 56, Repert., p. 259*).—The method is not considered reliable.

The estimation of iron oxid and alumina in phosphate rocks, T. S. GLADDING (*Jour. Indus. and Engin. Chem., 1 (1909), No. 4, pp. 249, 250; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 9, p. 485*).—The method proposed is as follows:

"Boil 5 gm. of the rock phosphate for 1 hour in 50 cc. hydrochloric acid (1:1), filter into a 250 cc. flask, add a few cubic centimeters of peroxid of hydrogen solution, boil for a few minutes to oxidize iron and expel oxygen, cool, fill to mark, and mix. Take 25 cc. (½ gm.), heat to boiling, add ammonia to alkalinity, then hydrochloric acid till just clear, then 1 gm. of oxalate of ammonium in crystals, boil gently for a short time, let settle and filter from precipitated oxalate of lime into a 500 cc. Kjeldahl flask, add 5 cc. concentrated sulphuric acid, evaporate to white fumes to destroy excess of oxalic acid. (This boiling down and destruction of oxalic acid can be done in 20 minutes.) Cool, add 50 cc. water, 5 cc. strong hydrochloric acid, and boil gently a few moments to dissolve any dehydrated sulphate of iron, boiling until solution is clear. Rinse into beaker, make up to about 150 cc. and precipitate the iron and alumina as phosphates either by adding ammonia to neutrality using methyl orange as an indicator, or by making the solution just alkaline with ammonia, just clearing with hydrochloric acid and then adding 25 cc. of acetate of ammonia solution (sp. gr. 1.04). Filter and wash the precipitated phosphates with a boiling hot nitrate of ammonia solution (2½ per cent). Ignite and weigh, deduct the iron phosphate present and multiply the remainder by 0.418 to obtain the alumina.

"The iron oxid is determined by taking 50 cc. (1 gm.) of the rock phosphate solution and titrating by either bichromate of potash solution or permanganate of potash solution."

Determinations of the water-absorptive power of peat litter, A. G. PALMQUIST (*K. Landtbr. Akad. Handl. och Tidskr., 47 (1908), No. 5–6, pp. 398–402*).—This article gives briefly the results of a critical examination of various methods which have been proposed for this purpose, particularly those of Fleischer and von Feilitzen. Attention is called especially to the importance of having the same bottom area in the apparatus used and of employing the same quantity of peat.

Hydrolysis of crystallized albumen from hen's egg, T. B. OSBORNE, D. B. JONES and C. S. LEAVENWORTH (*Amer. Jour. Physiol., 24 (1909), No. 2, pp. 252–262*).—Results of studies of the cleavage of crystallized egg albumen are reported in comparison with the work of other investigators. Of the 50.08 per cent of hydrolysis products obtained, the constituents present in greatest quantity were leucin, glutaminic acid, and phenylalanin, with 10.71, 9.10, and 5.07 per cent, respectively.

"The low summation shown by our hydrolysis is not due to any defect in carrying out the processes incident to the isolation of the amino-acids, for throughout the entire analysis the separations were effected with unusually small losses. The unusual deficiency, in our opinion, is rather to be attributed to the presence of some nonprotein complex which, in combination with protein,

constitutes this albumen. Possibly some complex similar to chondroitin-sulphuric acid may here occur, which is suggested by the fact that the amount of sulphid sulphur to be obtained from ovalalbumen indicates that one-half of its total sulphur belongs to some other complex than cystin."

The hydrolyzed products of casein, H. SKRAUP (*Monatsh. Chem., 29 (1908), No. 8, pp. 791–798; abs. in Zentbl. Physiol., 23 (1909), No. 4, p. 117*).—Among the hydrolytic products of casein three different substances were found which had the composition of leucyl—valyl—anhydrids but could be distinguished by their rotary powers. Other products found were leucin and a mixture of butyl and amyl amins.

Note on the hydrolysis of casein with hydrochloric and sulphuric acids, Z. H. SKRAUP and W. TÜRK (*Monatsh. Chem., 30 (1909), No. 3, pp. 287, 288; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 9, p. 488*).—When casein was boiled with six times its quantity of fuming hydrochloric acid for 6 hours about the same amount of glutamic acid was obtained as when boiled for 18 hours with nine times the quantity of 33 per cent sulphuric acid.

On the refractive indices of solutions of the caseinates and the acid- and alkali-equivalents of casein, T. B. ROBERTSON (*Jour. Phys. Chem., 13 (1909), No. 6, pp. 469–489*).—Investigations are reported which show that the concentration of casein solutions can be very accurately determined by their refractive indices. Among the conclusions reached are the following:

"The difference between the refractive indices of two solutions of a caseinate which differ only in their casein content, is proportional to the difference between the percentages of casein which they contain. . . . The hydrochloric-acid-equivalent of casein (that is, the quantity of acid required to just dissolve 1 gm. of casein) has been determined, by methods described in this paper, and, for solutions containing 1.25 per cent of casein, it was found that 1 gm. of casein = approximately 32×10^{-5} equivalent-gram-molecules of HCl. . . . The NaOH-equivalent of casein has been determined, by methods described in this paper, for solutions containing 2 per cent of casein, and it was found that 1 gm. of casein, at 'saturation' of the base = 11.4×10^{-5} equivalent-gram-molecules of NaOH. The LiOH-equivalent was found to be identical with the NaOH-equivalent."

Introductory manual for the repression of adulteration, J. LEMERCIER (*Manuel Élémentaire pour la Répression des Fraudes. Paris, 1909, pp. XIII+600*).—Legislative enactments, analytical methods, and similar data are included in this extended volume designed for use in food inspection work, especially with reference to French conditions.

Detecting and measuring incipient putrefaction in meat, A. SCALA and G. BONAMARTINI (*Ann. Ig. Sper., n. ser., 19 (1909), No. 1, pp. 113–122*).—Using different kinds of meat, the authors determined the color, odor, reaction, water-soluble material, total nitrogen, ammonia, volatile sulphur, and other constituents, in samples of different ages, and reached the conclusion that the best method of judging of the wholesome condition of meat is by determining the amount of volatile reducing substance present.

Researches on lard and beef fat, S. ALBERTO (*Staz. Sper. Agr. Ital., 42 (1909), No. 3, pp. 179–191*).—After reviewing the work of other investigators the author presents analytical data to show that the adulteration of lard with beef fat may be detected by the microscope and by determining the melting point of the crystals obtained from ether solutions.

A new micro-chemical method for identifying rye and wheat starch, W. LENZ (*Pharm. Ztg., 54 (1909), No. 45, pp. 441, 442*).—According to the author, starches of different origin exhibit differences in the rapidity with which the

grains swell when treated with a solution of crystalline sodium salicylate. The solution recommended is made of 1 gm. salicylate to 11 gm. of water. The progress of the reaction is followed with a microscope.

Experiments on peas greened with copper and on Manila cream and gelatin treated with copper, R. Krżiżan (*Ztschr. Öffentl. Chem., 15 (1909), No. 2, pp. 31–34; abs. in Chem. Zentbl., 1909, I, No. 8, pp. 675, 676*).—The results of the examination of these food products are discussed.

A new method for testing honey, Langer (*Südd. Apoth. Ztg., 1909, No. 19; abs. in Schweiz. Wchnschr. Chem. u. Pharm., 47 (1909), No. 20, pp. 316, 317*).—The author describes a method for detecting artificial honey by means of the precipitin reaction obtainable with the protein of natural honey.

Judging honey, J. Hertkorn (*Chem. Ztg., 33 (1909), No. 53, p. 481*).—A summary of data on the analysis of honey.

The use of temperature corrections in the polarization of cane sugar and other products by means of a quartz prism saccharimeter, C. A. Browne (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 640, II, pp. 404–431*).—An extended study and discussion of methods.

Annual report of the experiment station for the Java sugar industry for 1908 (*Jaarver. Proefstat. Java Suikerindus., 1908, pp. 259, pl. 1, figs. 7*).—This report consists chiefly of analytical data relating to sugar investigations.

The Schmitt method of determining total ether extract in wine, F. Scurti and G. De Plato (*Ann. R. Staz. Chim. Agr. Sper. Roma, 2. ser., 2 (1907–8), pp. 325–332*).—A contribution to the study of methods.

The correction of acid and a new method for determining free volatile acid in wine, N. Gallo (*Staz. Sper. Agr. Ital., 42 (1909), No. 1–2, pp. 37–50*).—A contribution to the chemistry of wine.

The brewer's analyst, R. D. Bailey (*New York and London, 1907, pp. X+423, pls. 22, figs. 131*).—This is a "systematic handbook of analyses relating to brewing and malting, giving details of up-to-date methods of analyzing all materials used and products manufactured by brewers and malsters, together with interpretation of analyses, polariscopical, microscopical, and biological work." There are appendixes which contain tables, factors, and typical analyses.

The quantitative determination of purity of linseed cake and linseed meal, J. C. Schoute (*Landw. Vers. Stat., 70 (1909), No. 3–4, pp. 181–247, fig. 1*).—It is pointed out that the results obtained by the methods now in use for the detection of the adulterations found in linseed meal and other feeding stuffs are liable to be affected by errors of various kinds. The errors arising because of the unequal size of the particles composing the feed are eliminated to a large extent by the use of an ocular mesh-micrometer and a method described by the author.

Investigations on the purity of linseed cake and linseed meal, J. A. Ezendam (*Cultura, 20 (1908), No. 237, pp. 280–297*).—This is a report of the chemical and botanical study of linseed products which were found to be adulterated with many grass and weed seeds.

The estimation of fat in unsweetened evaporated milk, O. F. Hunziker and G. W. Spitzer (*Indiana Sta. Bul. 134, pp. 591–651, figs. 7*).—The purpose of these experiments was to determine the cause of the low percentage of milk fat in commercial evaporated milks.

The process of manufacture is described and the popular attempts to explain the low percentages of fat are discussed. Analyses showed that as determined by the Babcock test and by the ether extraction method in every case there

was a shortage in the percentage of fat. This shortage was almost uniformly greater in the ether extraction than in the Babcock test. The Reichert-Meissl, and iodin values and the melting points of mixed fats and the insoluble fatty acids showed that there was no loss of volatile fat by evaporation.

In evaporated milk the casein is precipitated into insoluble curd and each particle of curd locks up a part of the butter fat. In order to liberate this fat larger amounts of sulphuric acid were used with the Babcock test but did not affect the test materially, neither did potassium hydrate used as a solvent before adding the acid. Borax as a solvent increased the percentage somewhat.

The samples of evaporated milk were then exposed to the acid for 1 to 24 hours before being centrifuged, with the result that the samples in which the milk remained exposed to the acid for 24 hours tested on an average within 0.1 per cent of the calculated percentage but the fat remained cloudy. Holding the bottles for only 1, 4, or 8 hours did not appreciably influence the result.

A one-fourth dilution of the evaporated milk, 1 part milk to 3 parts water, increased the test to the correct percentage of fat but did not improve the clearness of the reading.

The addition to the test bottle of hot dilute sulphuric acid, 1 part acid to 1 part water, in the place of hot water after the first whirling prevented the precipitation of charred and curdy masses and yielded a clear fat column, making accurate reading possible. A series of comparative tests with this modified Babcock test gave uniformly correct results.

Experiments were then made to improve the official ether extraction method. Prolonged ether extraction increased the fat yield slightly, but when continued for 24 hours there was still a shortage of 0.5 of 1 per cent of fat. The greater the degree of dilution of the evaporated milk the more nearly complete was the ether extraction. When the greater part of the proteids was removed by leaching the paper coil with dilute acetic acid for 2 hours, with subsequent ether extraction for 8 hours, all of the fat was liberated and yielded uniformly correct results.

"The results of the modified ether extraction with 12 different brands of evaporated milk averaged 1.69 per cent fat higher than those reported by a commercial chemist. The minimum difference was 0.67 per cent, the maximum difference was 3.28 per cent fat. . . .

"The season of year when manufactured, the degree of concentration, and the particular process of manufacture affect the properties of the caseous matter in evaporated milk. These factors explain the difference in the results obtained by the ordinary method of fat determinations with samples of different brands. The Gottlieb method offers many advantages and the results are uniform, but the percentage of fat is low."

Full directions are given for using these modified Babcock and modified ether extracting methods for testing unsweetened condensed milk.

The detection of added water in altered milk, A. Kling and P. Roy (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 16, pp. 1050–1052; Ann. Chim. Analyt., 14 (1909), No. 6, pp. 215–217; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 539*).—The total nitrogen content of two samples of milk kept for 2 years in storage in a closed vessel was found to remain stationary, although changes occurred in the nitrogen compounds. According to the authors this serves as a basis for the detection of watered milk, by a method which is described, when it is necessary to keep a suspected sample for some time.

On the ash content of serum as a test for detecting watered milk, H. Sprinkmeyer and A. Diedrichs (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17*

(*1909*), *No. 9, pp. 505–512*).—Analyses of whole milk, skim milk, buttermilk, and cream are given, which lend support to the efficiency of specific gravity and the ash content of spontaneously coagulated serum in detecting watered milk.

On the determination of the dirt content in milk, G. Fendler and O. Kühn (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 9, pp. 513–526, fig. 1*).—This article is chiefly a discussion and description of methods for determining the amount of dirt and sediment in milk.

Analysis of industrial casein, P. Dornic and P. Daire (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 4, pp. 430–437; Rev. Gén. Lait, 7 (1909), No. 14, pp. 328–332*).—Analytical data are reported on the determination of water, fat, and ash in casein used for making galalith and other similar products.

A study of the fatty acids of fish oils, L. M. Tolman (*Jour. Indus. and Engin. Chem., 1 (1909), No. 6, pp. 340–345*).—The analytical data reported show that oils from fresh and from salt-water fish and from animals living on fish are remarkably alike in the composition of the unsaturated fatty acids and mixed glycerids present. The unsaturated fatty acids belong to a series entirely different from any known in any vegetable or land-animal oils as yet studied.

Studies of the fat and nitrogen content of a number of nuts, H. Kühl (*Pharm. Ztg., 54 (1909), No. 6, p. 58; abs. in Chem. Zentbl., 1909, I, No. 8, p. 676*).—Peanuts, Brazil nuts, hazel nuts, and walnuts were included in this investigation.

On the oil in the fruit of Æsculus hippocastanum (horse-chestnut), M. Stillesen (*Chem. Ztg., 33 (1909), No. 55, pp. 497, 498; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 531*).—The following values are reported: Saponification 194.5, iodin 95.4, Reichert-Meissl 1.54, Hehner 92.9, acetyl 13.5, specific gravity 0.926, refractive index 1.4747.

The fruit of the Aralia hispida, J. M. Gilchrist (*Chem. News, 99 (1909), No. 2579, pp. 211, 212*).—Analysis of the fruit of this plant showed that it contains 41.72 per cent sugar, 1.5 per cent nitrogen, and 7.98 per cent of oil that had a saponification value of 517. Tartaric and citric acids were present. The ash constituents and other values were also determined.

[Miscellaneous analyses], E. F. Ladd (*North Dakota Sta. Rpt. 1908, pt. 1, pp. 29–38*).—The substances analyzed at the station last year included formaldehyde, lignite coal, proprietary disinfectants, flaxseed, sodium arsenite, sugar beets, stock feeds, wheat, bran, and shorts, and alfalfa and linseed meals.

Annual report of the Swiss agricultural chemical station at Zurich, 1908, A. Grete (*Landw. Jahrb. Schweiz, 23 (1909), No. 3, pp. 205–224*).—This is the usual annual report and consists chiefly of analytical data regarding fertilizers and feeding stuffs.

Annual report of the agricultural experiment station at Marburg for the year 1908–9, E. Haselhoff (*Jahresber. Landw. Vers. Stat. Marburg, 1908–9, pp. 20*).—This report consists of an outline of the various lines of work undertaken at the station and reports analytical data on fertilizers and feeding stuffs.

Report of the agricultural experiment station at Rostock from January 1, 1907, to June 30, 1908, Heinrich (*Tät. Ber. Landw. Vers. Stat. Rostock, 1907–8, pp. 18*).—This report consists chiefly of analytical data relating to foods, feeding stuffs, fertilizers, and seed tests of grasses and legumes.

Report of progress in animal chemistry, R. Maly, R. Andreasch, and K. Spiro (*Jahresber. Tier-Chem., 37 (1907), pp. VIII+1275*).—This is the annual report of progress in the physiological and pathological chemistry of animals, and consists of abstracts of the more important articles published during the year.

METEOROLOGY—WATER.

[Meteorological observations at North Dakota Station], E. F. Ladd (*North Dakota Sta. Rpt. 1908, pt. 1, pp. 18–29*).—Observations on temperature, rainfall, sunshine, wind movement, and evaporation are summarized as in former reports. The mean temperature for 1908 was 42.26° F. The maximum temperature was 97°, July 10, the minimum, —29°, Jan. 29. The rainfall was 18.98 in. as compared with an average rainfall for 15 years preceding 1907 of 21.36 in. The total amount of water evaporated from the water surface for the 5 months May to September was 37.24 in., or 2.76 times the rainfall for the same period.

Meteorological data, H. L. Price and A. W. Drinkard, Jr. (*Virginia Sta. Rpt. 1908, p. 150*).—Observations on temperature, precipitation, prevailing winds, and cloudiness from January 1, 1907, to December 31, 1908, are summarized in tables.

Climate and meteorology of Australia (*Off. Yearbook Aust., 2 (1901–1908), pp. 123–153, dgms. 3, map 1*).—The history of meterological observations in different parts of Australia is briefly reviewed, the present organization of the meteorological service is described, and the available data relating to temperature, pressure, precipitation, winds, storms, etc., are summarized. The principal influences affecting Australian climate are also briefly discussed.

Is our climate changing? J. W. Moore (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 623–625*).—Reviewing the available data on the subject, the author concludes "that, within the past six centuries at all events, no appreciable change has taken place in the climate of the British Isles. There is not a scintilla of evidence to show that any such change has taken place in the past or is likely to take place in the future."

The compensation between types of seasons in certain regions of the earth, H. H. Hildebrandsson (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 23, pp. 1559–1562, dgm. 1; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 25, p. 795*).—It is stated that cold seasons in the region of Iceland and the north of Europe are accompanied by warm seasons over Central Europe and vice versa. Other illustrations of such opposition in temperature are cited.

The isothermal layer of the atmosphere, W. N. Shaw, C. J. P. Cave, and A. L. Rotch (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 591–594*).—Summaries of three papers on this subject are given.

Climatic temperature tables and heat requirement figures, O. Krell, Sr. (*Gsndhts. Ingen., Festnummer, 1909, June 10, pp. 27–35, figs. 10*).—Tables and diagrams prepared from long-period observations at a number of places in Europe are given.

Climatic requirements of the maize crop, J. Burtt-Davy (*Transvaal Agr. Jour., 7 (1909), No. 27, pp. 431–437*).—Altitude, temperature, and rainfall with reference to the growth of corn in the Transvaal are discussed.

"Temperature appears to have no direct effect upon the yield of maize per acre, but it does influence the maturing of the grain, and often in this way affects the yield of marketable grain, especially at our higher altitudes." Rainfall, however, has a very direct bearing upon yield. The data collected show that the summer rainfall conditions throughout the greater part of South Africa are eminently suited to maize production.

Report on the gaging of streams for 1907, R. E. Horton (*Ann. Rpt. State Engin. and Surveyor N. Y., 1907, pp. 359–599*).—This report "contains the results of observations of water levels along the lines of the Barge Canal as well as at gaging stations maintained in cooperation with the United States Geologi-

cal Survey for the purpose of determining the discharge of streams throughout the State."

The bacteriological investigation of drinking water, E. KOHN (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 1–5, pp. 126–144; abs. in Chem. Zentbl., 1909, I, No. 19, p. 1605*).—Tests of the influence of the character of the culture medium, its chemical reaction, and varying temperatures in the determination of the bacterial content of water are reported.

Studies on the purification of sewage by means of peat beds, A. MÜNTZ and E. LAINÉ (*Ann. Inst. Nat. Agron., 2. ser., 8 (1909), No. 1, pp. 15–59, figs. 3, dgms. 3*).—This article describes at length investigations, briefer accounts of which have already been noted (E. S. R., 19, pp. 524, 1014; 21, p. 115).

SOILS—FERTILIZERS.

The soil and soil preparation, E. A. MITSCHERLICH (*Fühling's Landw. Ztg., 58 (1909), No. 11, pp. 387–397*).—This article, assuming that physically the soil is a mixture of solid particles, water, and air, discusses the influence of physical properties (size of particles, structure, etc.), and the conditions which affect them, for example, depth and time of plowing, upon the productiveness of soils.

Investigations on the suspension and flocculation of fine particles in water suspensions, H. PUCHNER (*Landw. Vers. Stat., 70 (1909), No. 3–4, pp. 249–267; abs. in Chem. Abs., 3 (1909), No. 13, p. 1566*).—This article reviews studies of (1) soil particles which are not soluble in water and which are not flocculated by salt solutions; (2) particles which are not entirely insoluble and are therefore self-flocculating; and (3) particles which are somewhat soluble in water and have thereby lost the power of flocculation even when salt solutions are added. The retarding effect of organic substances on the flocculation of suspensions is emphasized. Flocculation is promoted by frequent stirring and by a marked decrease in soluble substances.

Do we possess a practical method of bacteriological soil investigation? H. FISCHER (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), Nos. 1–5, pp. 144–159; abs. in Chem. Zentbl., 1909, I, No. 19, p. 1605*).—As a result of a critical review of the literature of the subject, the author concludes that we do not now possess a method of bacteriological examination of soils which is of practical value.

The nitrogen cycle and soil organisms, S. F. ASHBY (*Bul. Dept. Agr. Jamaica, n. ser., 1 (1909), No. 1, pp. 2–10, pls. 2*).—An account is given of the processes by which free nitrogen of the air is fixed, nitrogenous matter broken down, and nitrification and denitrification brought about. Reference is made to the author's work in isolating a nitrogen-fixing organism from a Jamaican cane soil, as well as from English, Egyptian, East African, and South African soils, the African soils producing "a blue and finally golden yellow diffusible pigment."

The Jamaican cane soil organism is quite similar to the English type, with similar nitrogen-fixing properties. "It has been impossible, however, up to the present, to find this organism in old pasture and old meadow land showing an acid reaction, but it is always abundant in cultivated soil containing carbonate of lime." A method for isolating and studying the nitrogen-fixing power of this organism which proved satisfactory in the author's investigations is described.

Previous investigations of the author are referred to as showing "that, under English conditions, nitrification is nearly as active at a depth of 8 in. as at 4 in., but only about half as active at a depth of 12 in. from the surface." See also previous notes (E. S. R., 18, pp. 721, 722).

The influence of different bases on the transformation of ammonia and nitrate nitrogen, O. LEMMERMANN, H. FISCHER, and B. HUSEK (*Landw. Vers. Stat., 70 (1909), No. 5–6, pp. 317–334*).—A series of experiments to determine the effect of the addition of calcium, barium, and magnesium carbonates, and ferric hydroxid to culture solutions on the transformation of the nitrogen of ammonium sulphate and sodium nitrate into protein compounds, is reported.

Barium carbonate increased the transformation in the case of sulphate of ammonia and reduced it in the case of nitrate of soda. Calcium carbonate slightly increased the transformation in the case of sulphate of ammonia and still less in the case of nitrate of soda. Little or no increase in the rate of transformation was observed in the case of the addition of magnesium carbonate. Ferric hydroxid in all cases reduced the rate of transformation of nitrate nitrogen into protein compounds.

In general, the sulphate of ammonia was transformed to a greater extent than the nitrate of soda, and the author therefore concludes that the lower efficiency of sulphate of ammonia as a fertilizer observed in many cases may be due to the fact that it is to a larger extent used by micro-organisms in the production of protein compounds. The effect of calcium carbonate in reducing the efficiency of these nitrogenous fertilizers which is sometimes observed may also be ascribed to the fact that its use favors protein formation.

The influence of lime on the bacteria of a soil, H. FISCHER (*Landw. Vers. Stat., 70 (1909), No. 5–6, pp. 335–342*).—In the culture solution tests here reported it was found that both ammoniacal nitrogen and nitric nitrogen were converted by micro-organisms into protein compounds in considerable amounts, the former more rapidly than the latter. These protein compounds are soon decomposed again. The presence of calcium carbonate favored the formation of protein compounds slightly in the case of sulphate of ammonia and to a less extent in the case of nitric nitrogen. The presence of barium carbonate increased protein formation in the case of sulphate of ammonia and reduced it in the case of sodium nitrate. Magnesium carbonate reduced the transformation of ammoniacal nitrogen into protein substances. Ferric hydroxid reduced the transformation of both ammoniacal and nitric nitrogen.

These observations suggest an explanation of the lower fertilizing efficiency in case of ammonium sulphate than in case of sodium nitrate, as well as of the influence of lime in increasing these differences, caustic lime exerting an even greater influence upon the activities of the micro-organisms of the soil than calcium carbonate.

The nitrogen economy of cultivated soils, T. PFEIFFER ET AL. (*Mitt. Landw. Inst. Breslau, 4 (1909), No. 5, pp. 715–851; abs. in Mitt. Deut. Landw. Gesell., 24 (1909), No. 17, pp. 270, 271; Chem. Ztg., 33 (1909), No. 37; Repert., p. 173*).—This article explains on the basis of a large amount of analytical data that very delicate methods are required to distinguish small variations in the nitrogen content of soils and that results obtained in pot experiments are exaggerated or very different from those obtained in the field. In the former case also no account is taken of drainage losses.

Experiments are reported which show no advantage in increase of nitrogen by adding 2 per cent of sugar to the soil as suggested by Koch. The effect of sterilization in temporarily retarding but eventually increasing the bacterial activity in the soil is discussed.

The nitrogen economy of cultivated soils, P. EHRENBERG (*Fühling's Landw. Ztg., 58 (1909), No. 7, pp. 241–246*).—This is mainly a discussion of the limits of error in methods of studying the nitrogen economy of soils, supplementing that by Pfeiffer and others noted above.

The natural solution of the nitrogen question by soil inoculation, J. STOKLASA (*Österr. Chem. Ztg., 12 (1909), No. 10, pp. 128–130*).—Experiments are reported which indicate that inoculation of the soil with free living micro-organisms which fix the nitrogen of the air may be made of practical value in increasing the yield of such crops as oats, beets, and potatoes.

The importance of nitrogen fixation in cultivated soil, F. LÖHNIS (*Fühling's Landw. Ztg., 58 (1909), No. 12, pp. 425–437, dgm. 1*).—This article attempts to show that the nitrogen fixed in the soil as a result of the activity of micro-organisms may be sufficiently large in the course of a year (about 35.7 lbs. per acre) to be of considerable practical importance.

Denitrification: The effect of fresh and well-rotted manure on plant growth, M. FERGUSON and E. B. FRED (*Virginia Sta. Rpt. 1908, pp. 134–149, figs. 7*).—The work of other investigators on denitrification is reviewed and culture and pot experiments by the authors for the purpose of isolating and studying some of the denitrifying organisms most frequently found in fresh manure and determining the effect of their activity upon the growth of various crops are reported. The results are summarized as follows:

"(1) *Bacillus denitrificans* on liquid media will set free virtually all of the nitrates. *Bacterium fluorescens*, *B. putidum*, and many other organisms reduce nitrates to nitrites and ammonia.

"(2) The results of pot experiments show that the presence of denitrifying organisms will decrease the plant growth.

"(3) The applications of sodium nitrate with fresh manure not only causes a loss of the applied nitrate, but it may go on still further destroying other nitrates that may be present in the soil.

"(4) The number of bacteria per gram was much greater in the pots showing the largest decrease in yield.

"(5) Denitrification is not so common in clay soils as in open loams.

"(6) It is possible to add such a large quantity of nitrate of soda that the denitrifying bacteria are unable to reduce the nitrate fast enough to cause a very marked difference in growth of first crop.

"(7) Comparisons between fresh and well-rotted manure show a very marked increase in favor of well-rotted manure.

"(8) Denitrifying cultures applied to the pots show almost the same harmful effects as large applications of fresh manure.

"(9) New straw has a slight harmful effect, but not so marked as fresh manure.

"(10) To obtain the best results manure should not be applied until well rotted, but if used when fresh it should be applied some time before planting the crop."

Experiments on the action of stable manure and lime on upland moor soils, W. BERSCH (*Ztschr. Moorkultur u. Torfverwert., 7 (1909), No. 2, pp. 81–98*).—The results of a series of experiments with potatoes here reported show that on virgin moor soils during a wet season commercial fertilizers gave better results than manure and that under such conditions the addition of phosphoric acid, potash, and nitrates to the manure increased the yield over that produced by manure alone. Small applications of lime produced a slight increase in yield, while applications of about 1,785 lbs. per acre were without effect.

Industries of the lime nitrogen and allied processes, N. CARO (*Ztschr. Angew. Chem., 22 (1909), No. 24, pp. 1178–1182; Chem. Trade Jour., 44 (1909), Nos. 1152, pp. 621, 622; 1153, p. 641*).—This is a paper read at the International Congress of Applied Chemistry at London, giving the present status of these industries.

The fixation of atmospheric nitrogen, S. Eyde (*Sci. Amer. Sup., 68 (1909), No. 1748, pp. 9–11, figs. 6*).—The Birkeland and Eyde process of electrical fixation is described and tests of the fertilizing value of the product are summarized.

Nitric acid from the air, Bernthsen (*Ztschr. Angew. Chem., 22 (1909), No. 24, pp. 1167–1178, pls. 4*).—The author describes his method of oxidizing the nitrogen of the air by means of a long flame in a narrow tube, as well as the application of the method in a factory at Christiansand, Norway.

The manufacture of nitric acid from the air in Austria, F. Russ (*Österr. Chem. Ztg., 12 (1909), No. 11, pp. 142–145, figs. 9; abs. in Chem. Ztg., 33 (1909), No. 81, Repert., p. 358, figs. 2*).—This article describes and reports tests of the efficiency of the Pauling process employed by a factory near Innsbruck. The process is based upon the use of a flaming arc produced between diverging electrodes, a current of air being driven through the flame from below where the electrodes approach closest to each other.

Formation of nitric oxid from the air by means of a current of electricity of low voltage, G. W. Morden (*Trans. Amer. Electrochem. Soc., 14 (1908), pp. 113–141, figs. 5; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, pp. 520, 521*).—The work reported is a continuation of that of Haber and König, who used a cooled arc. The author, however, employed short arcs and a direct current. He obtained a concentration of 9.7 per cent of nitric oxid at 300 to 400 mm. pressure with low voltage. This corresponds to a yield of 92 gm. of nitric acid per kilowatt hour.

Changes which occur in lime nitrogen and nitrogen lime in storage and their determination, H. Kappen (*Landw. Vers. Stat., 70 (1909), No. 5–6, pp. 445–469*).—Investigations are reported which show that there was a considerable loss of nitrogen as well as transformation of cyanamid into dicyandiamid during the storage of these products. Perotti's titration method for the determination of the unaltered cyanamid was found reliable.

Mixing superphosphate and calcium cyanamid, E. Masson-Polet (*Jour. Soc. Agr. Brabant et Hainaut, 54 (1909), No. 26, pp. 626–628*).—Referring to an investigation on this subject by de Molinari and Ligot, which indicated the injurious effect of mixing superphosphate and calcium cyanamid, the author maintains that the fertilizing value of superphosphate is not seriously impaired by mixtures in which moist superphosphate is used.

A new method of making superphosphate (*Engrais, 23 (1908), No. 52, pp. 1241, 1242; abs. in Chem. Abs., 3 (1909), No. 11, p. 1320*).—In the method proposed tricalcium phosphate is treated with sulphurous acid in the presence of a little water. Soluble phosphate and calcium sulphite are produced. The soluble phosphate is removed by extraction with water and the sulphite is decomposed by heat. The sulphurous acid can be recovered for further use.

The valuation of insoluble phosphoric acid in commercial fertilizers, R. H. Fash (*Jour. Indus. and Engin. Chem., 1 (1909), No. 6, pp. 371, 372*).—The author maintains that it is unjust to give the same valuation to insoluble phosphoric acid in fertilizers regardless of the source from which it is derived, and proposes a method of microscopical examination which affords a means of determining the source of the insoluble phosphoric acid.

The valuation of raw phosphates, M. Ullmann (*Chem. Ztg., 33 (1909), Nos. 49, pp. 445–447; 50, pp. 454, 455; 51, pp. 462–464; 52, pp. 469–471*).—This article discusses in some detail the trade in raw phosphates, their valuation on the basis of analysis, and cooperative tests of various methods of analysis.

A phosphate problem for Illinois landowners, C. G. Hopkins (*Illinois Sta. Circ. 130, pp. 16, dgm. 1*).—The advantage of using raw phosphates on Illinois soils is discussed and the fact that humus as well as phosphorus is needed and

especially that the raw phosphate "must be used in connection with liberal amounts of manure or with a good crop of clover plowed under if satisfactory results are to be secured" on these soils.

Fertilizer inspection (*Maine Sta. Off. Insp. 9, pp. 17–31*).—This gives the results of analyses of manufacturers' samples of fertilizers licensed up to March, 1909, with notes on valuation of fertilizers.

AGRICULTURAL BOTANY.

Agricultural bacteriology, H. W. CONN (*Philadelphia, 1909, 2. ed., rev., pp. X+331, figs. 64*).—This work is designed as a study of the relation of germ life to the farm with laboratory experiments for students, and treats of the micro-organisms of soil, fertilizers, sewage, water, dairy products, miscellaneous products, and the diseases of animals and plants.

This is a second and revised edition of the author's work, which originally appeared in 1901 (E. S. R., 13, p. 623). Since the publication of the first edition the advance in all lines of agricultural bacteriology has been very great, and practically the entire work has been rewritten to include the new information. The present edition was planned with special reference to its use as a text-book and for laboratory purposes. A number of elementary experiments are given, the directions for which are sufficiently in detail for student use and which would serve as an introduction to the methods of bacteriological investigation.

The book may be considered a careful summary of the present information regarding agricultural bacteriology.

The bacterial flora of Hawaiian sugars, L. LEWTON-BRAIN and N. DEERR (*Hawaiian Sugar Planters' Sta., Div. Path. and Physiol. Bul. 9, pp. 36, figs. 21*).—An investigation has been carried on to determine the cause for the fall in polarization of sugars in storage, and especially on the voyage from Honolulu to New York, via Cape Horn.

The studies resulted in the isolation of 5 species of bacteria, which were grown in various media and their action on commercial sugars under various external conditions determined. It is believed that the deterioration depends on the influence of bacteria acting in the presence of a sufficiency of water and at a temperature favorable for their development.

Report of the assistant bacteriologist, E. B. FRED (*Virginia Sta. Rpt. 1908, pp. 25, 26, fig. 1*).—A brief account is given of the work conducted by the department of mycology, which was combined in 1907 with the department of bacteriology.

The work of the department of bacteriology has been largely devoted to a study of nitrogen-fixing organisms, about 50 species of native leguminous plants having been collected and studies made of the bacteria infecting their root nodules. By careful staining the bacteria may be seen entering the plants through root hairs, immediately after which a tubercle starts to form. A series of sections showed that mitosis goes on in the nodules much the same as it does in diseased tissues of animals. The mitotic figures are larger, very irregular and not well marked, and have an uneven number of chromosomes. In the normal root the mitotic figures are about one-sixth as large, very clear, and the chromosomes in numerous pairs. This seems to bear out the theory that the legume bacteria are symbiotic parasites of the plant.

Assimilation of nitrogen by different strains of Bacillus radicicola in the absence of the host plant. E. B. FRED (*Virginia Sta. Rpt. 1908, pp. 132–134, fig. 1*).—This work was carried out to make a study of the amount of nitrogen assimilated by different types of nodule bacteria.

For this purpose a nitrogen-free medium was prepared and inoculated with pure cultures of *B. radicicola* obtained from some 15 different species of leguminous plants. In liquid cultures the liquid became turbid after the second day and cloudy within 36 hours. An increased growth of the organisms was noted for about 2 weeks, and at the end of a month samples were taken from each flask and tested for total nitrogen by the modified Kjeldahl method. The amount of nitrogen present in the various cultures varied from 17 to 34 mg. of nitrogen in 100 cc. of media.

Pot experiments with sand inoculated and watered with a nitrogen-free medium were carried on, comparisons being made with similar pots watered with water without any nutrient material. At the end of 6 weeks samples were taken from the different pots and analyzed for total nitrogen. The results obtained corresponded with those obtained in the liquid cultures. The author believes that these pot experiments give a reasonable basis for the assumption that the inoculation of soils with bacteria from legume nodules will increase the content of nitrogen in soils even if no legumes are present. Without the presence of carbohydrates in the culture medium no nitrogen was assimilated.

After the analyses were completed the pots were removed to the greenhouse, planted with buckwheat, and moistened each day with distilled water. The seed germinated well, and for 2 weeks but little difference could be seen in the growth of the plants, but at the end of the third week the plants in the uninoculated pots began to wilt while those in the inoculated ones continued to grow.

The fixation of nitrogen by means of Bacillus radicicola without the presence of a legume, E. B. Fred and W. B. Ellett (*Plant World, 12 (1909), No. 6, pp. 131–135, fig. 1*).—Noted above from another source.

Nitrogen assimilation of Sterigmatocystis nigra and the effect of chemical stimulation, Marion E. Latham (*Bul. Torrey Bot. Club, 36 (1909), No. 5, pp. 235–244*).—The present paper is offered as a contribution to the knowledge of nitrogen metabolism of *Sterigmatocystis* (*Aspergillus*) *nigra*. In the experiments plate cultures were made of the fungus and kept growing under sealed bell jars in a nutrient medium to which zinc sulphate was added, previous experiments having shown that zinc sulphate had a stimulating effect on the growth of the fungus.

The nutrient medium contained nitrogen, and it was found that the fungus grown normally fixes free nitrogen which is found to be in combination if nitrogen compounds be supplied in favorable quantity. The amount of nitrogen so combined decreases if the culture be subjected to stimulation. The decrease is in absolute quantity and in amount per gram of dry weight of crop produced, the diminution being shown most markedly by the decrease in combined nitrogen in the substratum, from which it appears that the nitrogen may be used in metabolism. The amount of nitrogen entering into the composition of the mycelial felt remained relatively the same in normal and stimulated growths.

The author states that the work may be considered as confirming that of earlier investigators with normal cultures, and to have shown that while stimulated crops behave more economically with regard to their carbohydrate consumption, and while the amount of nitrogen entering into the composition of the fungal felt is relatively the same as for normal growth, yet with regard to nitrogen relations stimulated cultures are less thrifty than normal ones. It is shown that unless nitrogen be supplied in too great quantity the fungi are able to use gaseous nitrogen and bring it into chemical combination even in excess of actual needs.

The accumulation of nitrates in parasitic and saprophytic plants, L. Lutz (*Bul. Soc. Bot. France, 55 (1908), No. 2, pp. 104–109*).—The presence of nitrates

in phanerogamic plants has been shown by a number of investigators, and the author has sought to extend the list to parasitic and saprophytic plants.

An investigation was made of about 40 species of parasites, facultative parasites (called relative parasites by the author), and higher fungi, in which the nitrogen was determined. The author found that there was a variable accumulation of nitrates in the plants which was influenced somewhat by the amount of nitrogen contained in the substratum upon which they were growing. Among the parasites and fungi growing upon trees the proportion of accumulated nitrogen was always less than in the case of the facultative parasites. The greatest amount of nitrogen was found in the facultative parasites containing no chlorophyll.

The carbon assimilation in plants, H. EULER (*Ztschr. Physiol. Chem., 59 (1909), No. 1, pp. 122–124; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 559, II, p. 423*).—As a result of a study of the carbon assimilation in plants, the author concludes that oxalic acid can not be considered an intermediate product in carbon assimilation, but is rather an oxidation product of sugar, due to respiration. His experiments, it is claimed, support Ewart's criticism of Usher and Priestley's conclusion that formaldehyde is formed from carbon dioxid and a chlorophyll extract in the light (E. S. R., 18, p. 540).

The influence of magnesia on garden plants, particularly on roses, L. CHENAULT and G. TRUFFAUT (*Jour. Soc. Nat. Hort. France, 4. ser., 10 (1909), June, pp. 370–373*).—A brief account is given of the results of the application of sulphate of magnesia to roses, the experiments being taken up at the suggestion of the second author. Ash analyses of many garden plants showed a high magnesium content, and it was thought that the addition of some form of that element to fertilizers for garden plants and especially for roses would be advantageous. Subsequent experiments confirmed this opinion. It is claimed that in most soils the addition of 60 to 100 gm. of sulphate of magnesia will prove of great benefit to roses.

Studies on the oxidizing power of roots, O. SCHREINER and H. S. REED (*Bot. Gaz., 47 (1909), No. 5, pp. 355–388*).—This paper gives the results of a series of studies upon the oxidizing power of plant roots grown in aqueous extracts of soils and in solutions of various compounds. The results, it is believed, throw some light on the action of plants upon the soil and indicate how soil conditions affect certain functions of plants. The report is based on a previous publication of the Bureau of Soils of this Department (E. S. R., 20, p. 1016).

The effect of the color of leaves on their internal temperature, and observations on the periodicity of the appearance of young colored leaves of trees in the Tropics, A. M. SMITH (*Ann. Roy. Bot. Gard. Peradeniya, 4 (1909), No. 5, pp. 229–298, figs. 2*).—The results of studies made at the Peradeniya gardens on the effect of color in leaves on their internal temperature and observations on the periodicity of the appearance of young colored leaves of evergreen trees growing in the gardens are given.

The author found, by the aid of specially designed thermo-electric apparatus, that the internal temperature of any leaf could be obtained within 0.5° C. In still air with a humidity of about 70 per cent of saturation leaves were found to reach a temperature 15° above that of the surrounding air. In the shade such leaves have an internal temperature varying from 1.5° below to 4° above that of the surrounding air under different conditions.

The thickness of the leaf was found not to affect the final temperature reached in the sunlight, although it did influence the time taken to reach that temperature. Thick leaves in some instances took 10 minutes to attain a steady temperature after exposure, while thin leaves required only 3 minutes.

An attempt was made to estimate the magnitude of the cooling due to transpiration, and differences averaging 2.5° were determined in leaves having their stomata so arranged as to give different exposures.

The principal factor tending to reduce high temperature reached in sunlight was found to be the movement of the air, and breezes of various strengths were found to reduce the temperature attained in the sunlight from 2 to 10°.

Red leaves attained a higher temperature than white or pale leaves of the same thickness and texture, and immature thin colored leaves of various tropical trees may have either higher or lower temperatures than thick green leaves of the same species. This difference is believed to be due to the amount of anthocyanin in the leaf.

In the second part of the paper an account is given of observations made at intervals of a number of trees showing new growth, the leaves of which were sharply differentiated as to their color from the mature leaves. It was found that the new growth was most prevalent in the driest season and almost absent in the wettest months, and it is suggested that probably in a climate of high humidity it is only during the dry period that a sufficient transpiration stream is obtained to supply the large amount of mineral substances required in the formation of the new growth. If this should be true, the higher internal temperatures attained by the coloration of young leaves would also promote an increase in the transpiration stream.

A bibliography of publications relating to the subject completes the report.

Studies on Plasmodiophoraceæ and Phytomyxinæ, R. Maire and A. Tison (*Ann. Mycol., 7 (1909), No. 3, pp. 226–253, pls. 3, fig. 1*).—A study was made of a number of plants belonging to the Plasmodiophoraceæ, a type of which is *Plasmodiophora brassicæ*, and also of species of uncertain affinities which have been variously referred to this group and to the Phytomyxinæ. The species studied include *Sorosphæra veronicæ*, *Plasmodiophora brassicæ*, *Tetramyxa parasitica*, *Phytomyxa leguminosarum*, *Plasmodiophora alni*, *Plasmodiophora elæagni*, *Tylogonus agavæ*, and *Pseudocommis vitis*.

The authors state that *S. veronicæ* is not a filamentous fungus, as has been claimed, but belongs to the Plasmodiophoraceæ. This species and *P. brassicæ* represent two phases, a schizogenous and a sporogenous. The group to which these are referred should, the authors claim, be considered entirely independent and as intermediate between the Sporozoaires and Myxomycetes. *P. alni* and *P. elæagni* do not belong to this family but are Schizomycetes and should be grouped together under the generic name Frankiella. Likewise the organism living in symbiosis in the root tubercles of leguminous plants is a Schizomycete, the proper name for which would be *Phytomyxa leguminosarum*. *T. agavæ* and *Pseudocommis* spp. are not true organisms but are the results of degeneration of the cell contents.

The action of poisons on Chlamydomonas and other vegetable cells, H. W. Harvey (*Ann. Bot. [London], 23 (1909), No. 90, pp. 181–187, dgms. 2*).—The toxic action of dilute solutions of the isomers of various benzene derivatives upon Chlamydomonas has been studied, and the author determined the minimal concentrations required to cause cessation of movement in a culture of actively motile *C. multifilis* in 10 minutes. Comparisons are given showing the effect of these poisons on the root cells of white lupine and bacteria.

The results are tabulated and show that there is a similar reactivity of the different vegetable cells toward the same poison, and also a fairly constant relation between the chemical constitution of a poison and its toxic strength. The chemicals used in these experiments were orthodihydroxy-phenol, metadi-

hydroxy-phenol, paradihydroxy-phenol, orthocresol, metacresol, paracresol, orthophthalic acid, metaphthalic acid, and paraphthalic acid.

In other experiments the author found the following concentrations just to cause the cessation of movement in a culture of *C. multifilis* in 10 minutes: Hydrochloric acid 0.009 per cent, pyrocatechin 0.1 per cent, and resorcin 0.18 per cent.

Mixtures of these poisons, each slightly weaker than the minimum given above, failed to have the same poisonous effect that was shown by the single poisons in slightly greater strength.

Notes on the number and distribution of native legumes in Nebraska and Kansas, J. A. Warren (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 31, pp. 9*).—A series of investigations was begun in 1908 to determine the occurrence of wild leguminous plants in Nebraska, Kansas, and Colorado in order to throw some light if possible on the rôle that they may play in storing nitrogen in virgin soils. Counts were made from time to time of the species of leguminous plants in different plats. In the Sandhill region leguminous plants were found at the rate of 8.4 per square yard, in high plains 3.6 plants per square yard, and in the region east of 100° west longitude an average of 17 plants for each square yard, were found.

Seeds and plants imported during the period from October 1 to December 31, 1908. Inventory No. 17 (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 153, pp. 58*).—This gives a list of the seeds and plants imported by the Section of Seed and Plant Introduction during the period mentioned. The total number of introductions was 685 lots of seeds and plants, many of them coming from the collection of F. N. Meyer in China.

FIELD CROPS.

Field experiments in 1906–1908, C. D. Woods and J. M. Bartlett (*Maine Sta. Bul. 167, pp. 85–104*).—Various experiments with different field crops are summarized in this bulletin.

In fertilizer tests with potatoes in 1906, home-mixed and ready-mixed fertilizers were compared, but the results secured were not conclusive. A comparison of high-ridge and modified-ridge culture made in 1907 and 1908 left nothing to choose from between the two methods so far as yield was concerned. The work is to be continued in 1909.

A number of varieties of potatoes were tested for blight resistance, observations upon the growth and upon the quality of tubers being made entirely upon an unsprayed crop. As a result of this test 14 varieties have been discarded. A comparison of a proprietary brand of fungicide with regular Bordeaux mixture appeared to result in a decreased yield, due to an injury to the vines by the proprietary brand. The Bordeaux mixture was also the more effective in protecting from early blight.

The status of alfalfa culture in Maine is discussed and conclusions from a previous bulletin (E. S. R., 17, p. 1059) are again reported. Work in destroying wild mustard by spraying with copper sulphate and iron sulphate brought out the fact that young wild mustard (*Sinapis arvensis*) is readily killed by spraying with either solution, while the wild radish (*Raphanus raphanistrum*) is very resistant and even defied a treatment with a 20 per cent solution of iron sulphate reenforced with 5 per cent of sulphuric acid. Directions for killing wild mustard by spraying with these salts are given.

In liming experiments the lime was applied at the rates of 500, 750, and 1,000 lbs. per acre. Thus far results have indicated that the liming had comparatively little or no effect upon oats, while it gave a material increase in yield of

clover. One of the objects of the experiment is to test the effect of the lime upon the potato crop in 1909 and 1910.

[Work with field crops], G. E. Nesom (*Philippine Agr. Rev. [English Ed.]*, *2 (1909), No. 1, pp. 24–34*).—Brief notes on cultural tests with corn, alfalfa, sunn hemp and various leguminous fodder crops, grasses and rice are given. The yields are reported and the more promising varieties mentioned.

Sunn hemp (*Crotalaria juncea*) yielded seed at the rate of 2,395 kg. per hectare (about 2,132 lbs. per acre). Analyses of the meal and hulls of this seed are reported. Venezuela black cowpea planted January 13 ripened its first seed March 30. This variety produced a heavy yield of seed, and a rank growth of vine. A small plat of Lyon velvet bean planted January 11, 1908, required 5 months to mature, and yielded seed at the rate of 2,200 kg. per hectare (about 1,958 lbs. per acre). The Florida velvet bean is reported as growing fairly well on the stiff soil at Albang, and as giving a greater amount of green forage per acre than any other leguminous plant.

Guinea grass is reported as having produced 78 tons of green grass per hectare in one instance and a yield of 41 tons during the period of 61 days in another instance. The green forage production of teosinte in one experiment is recorded as 62,313 kg. per hectare (about 27.67 tons per acre) in 141 days. Pinursigui rice as compared with other varieties had the shortest growing period and produced the best yield. This variety was harvested October 25, 128 days after seeding, and produced 2,740 kg. per hectare (about 2,439 lbs. per acre). A second crop harvested December 17, yielded 25 kg. per hectare.

Report of the chemical control station and seed control station at Trondhjem, 1907, E. Solberg (*Ber. Stat. Kem. Kontrolstat. og Frökontrolanst. Trondhjem 1907, pp. 43*).—This reports chemical analyses of feeding stuffs, soils, fertilizers, dairy products, etc., and of seed analyses made during the year; experiments on 22 farms with top-dressing and miscellaneous fertilizer trials on meadows; and studies of the residual effects of previous fertilization.

Station report of the chemical and seed control station at Trondhjem, 1908, E. Solberg (*Ber. Stat. Kem. Kontrolstat. og Frökontrolanst. Trondhjem 1908, pp. 41*).—In 1908 this station examined 447 samples of feeding stuffs, 254 samples of soils, 158 samples of fertilizers, and 699 samples of seeds.

In fertilizer experiments with grass it was found that a top-dressing of 1.5 to 2 kg. of nitrate of soda and 5 kg. each of Thomas phosphate and kainit per hectare increased the yield of hay per hectare by about 320 kg. on the average, the increase being 230 kg. the first year and 80 kg. the second.

Report of the Shatilov Agricultural Experiment Station, V. Viner (*Otchet Shatilov. Selsk. Khoz. Opuitn. Stantzii, 2 (1907), pt. 1, pp. 291; abs. in Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 9 (1908), No. 5, pp. 638–644*).—The results of 9 years' experiments show that the use of a complete fertilizer increased the average yield of rye during the last 6 years by 175 per cent. Mineral fertilizers exerted a greater influence on the yield of grain than on the yield of straw. Phosphoric acid was the most effective element, and there was apparently no difference in effectiveness between soluble and insoluble forms.

Twelve years' results at the Odessa Experiment Station, V. Rotmistrov (*Zap. Imp. Obshch. Selsk. Khoz. Yuzh. Ross., 78 (1908), No. 1–2, pp. 26–76*).—Different depths of plowing chernozem for different crops were compared. The general conclusion is drawn that plowing the chernozem in the locality of Odessa deeper than 3½ in. is injurious.

Report for the year 1908 of the trade and agriculture of Poland and Grodno, C. Bayley (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1909, No. 4232,*

pp. 7–44).—This report gives among other things the production of the principal field crops grown in these regions, together with the quantities of sugar and spirits manufactured there.

Fibers, W. R. DUNSTAN (*Colon. Rpts., Misc.* [*Gt. Brit.*], *No. 58, pp. 142*).—Under textile fibers this report treats of animal fibers, flax, rāmie, jute, and fibers of other similar plants. Under cordage fibers, fiber plants of the genera Sansevieria, Musa, Agave, Furcræa, Phormium, Yucca, Hibiscus, etc., are discussed. Under miscellaneous fibers, silk cottons, paper making materials, raffia, and other fiber producing plants of that type are included.

Fertilizer and seeding experiments with root crops, C. F. CLARK and E. R. MINNS (*New York Cornell Sta. Bul. 267, pp. 415–439, fig. 1*).—Commercial seed in these tests gave as good results as home grown seed, and seeding with a hand drill produced a better stand and consequently a larger yield than seeding with a grain drill. The use of 12 lbs. of mangel seed and 2 lbs. of ruta-baga seed per acre gave the best results as compared with other quantities.

The results of two years indicate that lime is not beneficial to mangels on the clay loam soil of the university farm. The largest yields were secured with the use of a complete fertilizer application, while the use of nitrogen and phosphorus combined proved the most economical. The relative efficiency of the carriers of nitrogen, phosphorus, and potassium used singly was in the following order: Acid phosphate, nitrate of soda, and muriate of potash. The highest percentage of foliage was produced by nitrate of soda, followed by muriate of potash and acid phosphate in the order given. Nitrate of soda was apparently more efficient than dried blood as a nitrogen carrier.

Perennial leguminous crops in the southwestern part of the steppe region, A. BUICHĪKHIN (*Zap. Imp. Obshch. Sclsk. Khoz. Yuzh. Ross.*, 77 (*1907*), *Nos. 11, pp. 21–71; 12, pp. 20–66; abs. in Zhur. Opuitn. Agron.* [*Russ. Jour. Expt. Landw.*], *9* (*1908*), *No. 6, pp. 786, 787*).—Observations at the Ploti Experiment Station have shown that growing alfalfa, clover, and sainfoin under summer cereals does not increase the yields of the cereal crops because perennial leguminous plants draw too much moisture from the soil.

The wild alfalfas and clovers of Siberia, with a perspective view of the alfalfas of the world, N. E. HANSEN (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 150, pp. 31, map 1*).—This bulletin contains brief reviews of 3 trips to Siberia made by the author since 1897 together with descriptions of 7 species or varieties of alfalfa, and notes on the clovers of eastern European Russia and Siberia. The three Siberian alfalfas described are *Medicago falcata*, *M. platycarpa*, and *M. ruthenica*. In addition to these species *M. sativa*, *M. media*, *M. glutinosa* and *M. arborea* are described. The clovers noted are *Trifolium medium*, *T. montanum*, *T. lupinaster*, and *T. suaveolens*. A discussion on the acclimatization of plants to endure a greater degree of cold, and the acclimatization of perennial plants concludes the bulletin.

Report of progress in variety tests of barley, C. WILLIS and J. V. BOPP (*South Dakota Sta. Bul. 113, pp. 501–522, fig. 1*).—Variety trials with barley, in cooperation with the Bureau of Plant Industry of this Department, are in progress and this bulletin is a report upon this work.

In 1908, 87 varieties were grown at the station. The yields of the varieties for different years are given in tables. The varieties leading in average yield and their production per acre are as follows: Kitzing 189, 45.13 bu. for 4 years; Odessa 182, 43.91 bu. for 5 years; Swan Neck 187, 43.50 bu. for 5 years; Chevalier 10584, 41.21 bu. for 5 years; Chevalier 35, 40.94 bu. for 6 years; Hanna 24, 40.66 bu. for 5 years; and Minnesota 6, 40.54 bu. for 5 years.

Directions for barley culture are given, the importance of pure seed and the value of barley for different uses are pointed out, and meteorological data with

reference to the earliest and latest killing frosts, rainfall, and winds in the State are recorded.

Variety tests with two-rowed barley for 21 years, M. L. MORTENSEN and K. HANSEN (*Tidsskr. Landbr. Planteavl. 16 (1909), No. 1, pp. 1–74*).—The results of these tests show that for all medium barley soils, especially on the islands, the Tystofte Prentice and Svalöf Princess barley are the two best yielding varieties examined. On very rich ground they lack sufficient strength in the straw but no fully satisfactory varieties for such soils have as yet been found. Under less favorable conditions and where an early maturing sort is required Svalöf Hännchen appears preferable.

The importance of broad breeding in corn, G. N. COLLINS (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 141, pt. 4, pp. 33–44*).—The development of the present methods of corn breeding are discussed, the importance of uniformity is considered, and the cultural tendencies toward inbreeding are pointed out.

It is shown that the present methods tend toward close breeding, and this the author considers detrimental for corn. He states that selection for increased yield with the maximum rather than the minimum cross-breeding seems never to have been tried as a scientific experiment, but calls attention to the fact that a system of broad breeding has been practiced by farmers generally by choosing many ears from various scattered plants in large fields and mixing the shelled corn before planting. It is pointed out that the score card operates to intensify the closeness of selection, since uniformity in formal characters can be secured only by close breeding. Several instances are cited which indicate the value of broad breeding in increasing the yield and maintaining vigor, and a method is suggested by means of which the production of hybrid seed for commercial planting is made feasible.

"To secure hybrid seed it would only be necessary to plant two distinct varieties in alternate rows, detasseling one variety and using the seed from the detasseled variety for the next year's general planting. Seed from the variety that was not detasseled would not be mixed, and selections could be made to supply the breeding plat for the two following years. By detasseling the other variety in the next year a stock of pure seed of this also could be grown. . . . The same result could be approximated by planting in the same way and detasseling one of the varieties in one-half of the field and the other variety in the other half of the field. By this method seed of both the varieties would be secured each year, but there would be considerable indiscriminate crossing."

The elimination of barren stalks from a field or seed plat is considered a practice of doubtful value, inasmuch as it results in increasing the percentage of self-pollinated plants. With characters that are not affected by decreased vigor continuous advance may be made by selection.

A preliminary report on cotton experiments, F. G. KRAUSS (*Hawaii Sta. Press Bul. 24, pp. 16*).—This describes the investigations in the culture of cotton in progress under the direction of the station, and also contains an account of the propagation of selected plants by means of cuttings. Nine varieties of strains representing 3 distinct classes of cotton are under comparative test for yield, quantity of lint, habits of growth, and methods of culture.

The Florida and the Georgia strains of Sea Island cotton were grown. The Florida strain yielded at the rate of 1,322 lbs. of cotton seed per acre, or 409 lbs. of lint, while the Georgia strain gave 2,270 lbs. of seed cotton or 703 lbs. of lint. The first picking gave by far the largest yield, mainly because later the bollworm infested the plants.

An Upland type of cotton of Chinese origin gave an average yield of approximately 1 lb. of seed cotton per plant, equivalent to 1,150 lbs of lint cotton per acre. The plant is described as extremely prolific and a continuous bearer.

An average of nearly 50 mature bolls per plant presented themselves at one time. The first picking was made September 12, as compared with September 8 for the Sea Island strains. The lint is classified as a very fair grade of American Upland in length.

The Caravonica class of cottons, including the 3 strains designated as wool, silk, and kidney, were also under test. The results bring out the heavy yielding power of this class. It is estimated that 2-year-old plants of these strains produced in a series of 10 specimens an average yield of 104, 70, and 57 oz. of seed cotton per plant, respectively, during a period of about 12 months. Owing to neglect of the plants, which had not been tilled, irrigated, or pruned during the year, the quality of the fiber had greatly deteriorated. Caravonica wool from the same stock of seed used by the station, but planted in a well sheltered spot January 6, 1908, began bearing in August and has continued to fruit almost uninterruptedly up to the present time. The 3 best plants during the first 12 months of growth produced 36, 40, and 48 oz. of lint, respectively. The quality of the lint produced was exceptionally good.

Pruning experiments were conducted with Sea Island cotton. In one test plants were cut back to within 3 or 4 in. of the ground, and in the other to from 12 to 20 in. or to about $\frac{1}{3}$ to $\frac{1}{2}$ their original growth. No laterals were permitted on the low pruned plants, but spurs of 2 to 4 buds were left on the long pruned canes. Results at present indicate that the best growth is secured from low pruning in January, plants so treated making the strongest and most uniform growth of wood, and appearing most prolific. The results also seem to show that Sea Island cotton will adapt itself to culture as a perennial.

Cuttings made of branches and from immature wood of Caravonica plants gave indifferent results, but under a second test when cuttings were made from the tip end the intermediate portion, and the base of the best formed and most fruitful branches of Sea Island and Caravonica plants, about 50 per cent of all the cuttings planted rooted and made a satisfactory growth. Caravonica root cuttings practically all grew, and are making a fine growth, while Upland cuttings failed entirely. With Sea Island the base cuttings rooted best while with the Caravonica the tip cuttings gave the largest percentage of strong plants. In 100 days the cuttings showed a growth of from 12 to 30 in. and squares were forming on some of the advanced plants.

Fertilizer experiments with cotton, J. N. Harper (*South Carolina Sta. Bul. 145, pp. 3–31, pls. 10*).—This bulletin presents data indicating the effect produced in cotton culture by the judicious use of commercial fertilizers, the rotation of crops, the application of farm manures, and the use of improved farming implements. The investigation has not been completed and the results here given cover only a few years' work.

The plan of the experiment is to study various fertilizing ingredients in varying amounts when applied to cotton in a rotation. The plats have been in cotton and fertilized for 3 years. In 1909 all the plats are growing winter oats, which will be followed by cowpeas and the cowpeas by rye, which will be plowed under in the spring of 1910. That year all plats will again be planted to cotton with hairy vetch, crimson clover, or bur clover as a fall catch crop. In 1911 the plats will be planted in corn and cowpeas, and in the fall of that year oats will again be sown. In 1912 the plats will be in oats, followed by cowpeas, and these in turn by rye, which will be plowed under in the spring of 1913 and the plats again planted to cotton. More than 100 plats will be used in this experiment.

Before this work was begun the land had been planted in cotton, oats, and corn for a number of years. In 1905 it was planted with Marlboro Prolific corn, fertilized with 400 lbs. of a complete fertilizer to the acre, and the yield

secured was at the rate of 15 bu. per acre. In 1906 wheat was plowed under, fertilizers applied, and the land planted to Black Seeded Blue Ribbon cotton. The results of these fertilizer tests for 1906, 1907, and 1908 are given in tables.

When nitrogen alone was applied an increase of $11.07 per acre above the check test was secured the first year, and of $6.48 the second year, while the third year a loss of $3.56 per acre was sustained. It is concluded from the results that while nitrogen is highly essential on this soil it must be combined with acid phosphate to give the best results. A plat receiving only nitrogen for 3 years yielded at the rate of 450 lbs. of seed cotton in 1908, while another plat having received in addition to cotton-seed meal and nitrate of soda, acid phosphate and potash in 1906 and 1907, yielded at the rate of 954 lbs. of seed cotton per acre. When used as the only source of nitrogen, nitrate of soda gave the best results, but cotton-seed meal showed the better residual effect. The author found that wherever nitrate of soda was used under cotton the crop grew more vigorously from the start than without this treatment, and he therefore recommends the use of nitrate of soda on cotton at the rate of 25 to 50 lbs. per acre. In 1908, when sulphate of ammonia and nitrate of soda were compared as top-dressings it was shown that the yields where these two substances were used were the same, but that the sulphate in the early spring was much slower in its action than the nitrate.

Observations on the use of acid phosphate showed that it was profitable only to a certain limit, and that for this type of soil, which is low in humus, this limit ranged from 400 to 500 lbs. per acre. It is stated that acid phosphate aside from its value as a plant food is of great advantage in hastening the maturity of cotton, and it is shown that this is borne out by the tabulated results.

The use of potash gave only small returns, and it is believed that only small quantities should be used in mixed fertilizers intended for cotton. Plats receiving manure from cattle fed cotton-seed meal and corn silage produced the highest yields and the highest net gain, although no manure was applied the third year and no other fertilizer was applied with the manure than acid phosphate. The manure was applied at the rate of 8 tons per acre and the acid phosphate at the rate of 352 lbs. in 1906. In 1907, 8 tons of manure was again used and 704 lbs. of acid phosphate, and in 1908 only 352 lbs. of acid phosphate was used. The data show that the residual effect of commercial fertilizers is comparatively small, while that of manure is much more lasting.

In one test with lime costing $7.50 per ton, there was a net gain for 3 years of $9.46 as due to the lime. The author concludes from his observations that lime not only assists the leguminous plants in accumulating nitrates in large amounts in the soil but aids also in some way in keeping this nitrogen from being washed out during the winter. Lime is considered one of the essentials for a complete fertilizer on this soil, and it is recommended that farmers apply lime at least once every 4 years to their cotton soils.

The results of the work so far are summarized with the statement that the average amount of commercial fertilizer used on this soil, which is about 400 lbs. per acre, is not the most economical and that larger applications would be more profitable. Suggestions for the home mixing of fertilizers for different types of soil are given.

The seed of Eruca sativa and its extraction residues, S. Hals and J. F. Gram (*Landw. Vers. Stat., 70 (1909), No. 3–4, pp. 307–315*).—Descriptions of this plant and its seeds by different authors are briefly reviewed and the composition of the seed and of the material remaining after the oil is extracted is reported. Four samples of extraction residues contained on an average 10.53 per cent of moisture, 2.53 per cent of fat, 39.50 per cent of protein, 29.85 per

cent of nitrogen-free extract, 8.74 per cent of crude fiber, and 8.85 per cent of ash.

The water consumption of lupines, VON SEELHORST (*Jour. Landw., 57 (1909), No. 1, pp. 111, 112*).—This article points out briefly some inaccuracies occurring in a previous report on experiments conducted to measure the water consumption of these plants (E. S. R., 20, p. 740).

Meadow fescue; its culture and uses, H. N. VINALL (*U. S. Dept. Agr., Farmers' Bul. 361, pp. 22, figs. 7*).—This points out that meadow fescue is most important in eastern Kansas and southeastern Nebraska, but calls attention to its value in pasture mixtures for the east-central States. The certain and strong germination of the seed, the palatability, and the ability to endure trampling and to thrive in wet spots are regarded as peculiarly advantageous for grass mixtures. The production of meadow fescue seed has been quite important in eastern Kansas, but owing to the prevalence of rust and the uncertainty of price the production is decreasing. Ordinary cheat (*Bromus secalinus*) is the worst impurity in commercial seed. Tall fescue is regarded as a substitute for meadow fescue where rust makes this grass unprofitable.

The necessity for new standards of hop valuation, W. W. STOCKBERGER (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 33, pp. 11*).—This circular points out the desirability of a definite standard for judging the quality of hops based upon other considerations than that of origin alone. In a discussion of the subject the author describes present methods of valuation, points out deficiencies of existing methods, together with the necessity for new standards, and gives data concerning the movement for an international standard.

Improvement of the oat crop, C. W. WARBURTON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 30, pp. 10, fig. 1*).—The need for improvement is discussed and the lines along which improvement can be effected are described. Under methods of improvement, mechanical selection, introduction of new seed, the use of the seed plat, individual plant selection, and hybridization are discussed. Varieties most likely to lend themselves to improvement work are listed. A description of a method for testing individual plant selections, as described by J. B. Norton (E. S. R., 18, p. 698), is reproduced.

A critical period in the development of oats, I, VIKHLYAER (*Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 9 (1908), No. 2, pp. 257–270*).—The author observed that a high soil moisture content when the crop is heading is conducive to a large yield, while a low moisture content tends to reduce production. According to his observations the mean temperature during the entire vegetative period is in inverse ratio to the yield and the length of the growing period.

Potato notes, E. R. BENNETT, W. PADDOCK, and S. A. JOHNSON (*Colorado Sta. Circ. 1, pp. 14*).—This circular presents brief notes on the potato industry and potato investigations in Colorado, selection and treatment of seed potatoes, irrigation, potato diseases and insect enemies, and the marketing and storing of the crop.

Preliminary report on potato germination troubles in 1909, T. C. JOHNSON ET AL. (*Virginia Truck Sta. Circ. 2, pp. 3–7*).—Upon investigation it was estimated that owing to losses from the rotting of Irish potatoes, largely confined to the Maine seed, the stand in the vicinity of Norfolk and Portsmouth, Va., was from 85 to 90 per cent, in the vicinity of Cape Charles, Accomac Court House, and Onley 75 to 85 per cent, and at Nandua and Davis Wharf 55 to 60 per cent. The losses in Maine Cobbler, the principal variety planted, ranged from 5 to 95 per cent. It is believed that these losses may have been due to a combination of the following unfavorable conditions: Immature seed, possible injury from high temperature during transit and storage, cutting too

small and too long before planting, lack of care of the cut seed, and a dry spring and cool weather after planting. The work is in cooperation with the Bureau of Plant Industry of this Department.

Results obtained from inoculating soy beans with artificial cultures, E. B. Fred (*Virginia Sta. Rpt. 1908, pp. 130, 131, fig. 1*).—The data presented here show that inoculated soy beans after soy beans produced 0.03 ton of hay and 3.34 bu. of seed more than when the crop was grown without inoculation under the same conditions. After spring oats the corresponding figures were 1 ton of hay and 6.67 bu. of seed. Oats on inoculated and uninoculated soil gave practically the same yield of straw, but there was a difference of 2.81 bu. of grain per acre in favor of inoculated soil.

The rôle of the oxalates in the germination of beet seeds, G. Doby (*Landw. Vers. Stat., 70 (1909), No. 1–2, pp. 155–158*).—Work along this line by other investigators is briefly reviewed, and the results secured by the author are reported. The data show that during the process of germination calcium oxalate remained unchanged, while the basic water-soluble oxalates still remaining in the seed after soaking entirely disappeared, no trace of them being found in the new growth.

The evaporation of water by sugar beets, P. Slezkin (*Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 9 (1908), No. 4, pp. 474–482*).—In a culture test at the Kiev Polytechnic Institute sugar beets were found to evaporate 337 gm. of water per gram of dry substance produced. In a field experiment in which a plat containing 59 sugar-beet plants was covered with cement, allowing only the plants to project, a yield of 26.946 kg. of sugar beets was secured, while a plat containing 78 plants cultivated in the ordinary way produced 16.144 kg.

Progress of the beet-sugar industry in the United States in 1908, C. F. Saylor (*U. S. Dept. Agr. Rpt. 90, pp. 74*).—This twelfth annual report on the beet-sugar industry in the United States discusses lines of future progress, including the production of the largest tonnage, the growing of high quality beets; increasing the use of by-products, the production of high quality beet seed; methods of cultivation and soil management, and the use of improved implements and machinery; reports on the disposal and use of by-products; presents field and factory results by States; lists the beet-sugar factories of the country; presents statistics of the sugar industry; points out the prospects of the industry in the various States; and compares the merits of cane and beet sugars.

The area planted to beets in 1908 exceeded that of 1907 by 20,000 acres, an increase of over 5 per cent, but unfavorable weather conditions caused an area of 56,389 acres or 13.4 per cent of that planted to be abandoned. The acreage harvested amounted to 364,913 acres, or nearly 2 per cent less than the harvested acreage in 1907 and about 3 per cent less than that of 1906. In 1908 there were in operation in the United States 62 factories, the average yield of beets per acre was 9.36 tons, the beets worked amounted to 3,414,891 tons, the quantity of sugar manufactured 425,884 tons, the average extraction of sugar based on the weight of beets was 12.47 per cent, the average sugar in the beets 15.74 per cent, the average purity coefficient being 83.5 per cent, and the average length of campaign 74 days. In addition to these data, statistics on the world's production of sugar and the development of the German beet-sugar industry from 1836 to 1906 are shown in tables.

Varieties of cane, D. W. May (*Porto Rico Hort. News, 2 (1909), No. 7, pp. 1, 2*).—This article is a general discussion of varieties of cane in Porto Rico and includes brief statements with reference to variety tests made at the Porto Rico Station.

The varieties which have given good results at the station are D 95, D 117, B 347, and B 1,355. T 77, D 117, B 347, and B 3,289 have proved drought resistant in the southern part of the island. In preliminary tests of seedling canes the following gave satisfactory results on the east end of the island: D 77, B 3,289, B 347, D 117, and D 95. The yield, sugar content, and purity of a number of canes are given in tables.

The passing of the Bourbon cane in Antigua, H. A. TEMPANY (*West Indian Bul., 10 (1909), No. 1, pp. 34–54*).—In yield the Bourbon cane did not differ greatly from the varieties grown at the present time. It was largely subject to attacks of rind fungus as shown by the amount of rotten cane found in the field, and its juice, giving about 1.9 lbs. of sugar per gallon, did not equal in richness the juice of the varieties which have taken its place. The attacks of the rind fungus reduced the sugar content and increased the glucose ratio.

The Bourbon contained less fiber but gave better milling results than the varieties now grown. Manurial treatment did not appear to make the cane more resistant to the rind fungus, and newly imported stock showed equal liability to its attacks. It is believed that the fungus threads secrete a ferment capable of dissolving a passage through the cell walls, and as the Bourbon cane was less fibrous than the White Transparent its cell walls were more easily penetrated. The most generally accepted theory regarding the spread of the disease was that of wound infection by means of wind-blown spores.

A cane stripping experiment at Olaa plantation (*Hawaii. Planters' Mo., 28 (1909), No. 6, pp. 195–200*).—Experiments were made to determine, if possible, the effect of stripping the cane on the yield of sugar and the probable gain or loss resulting from the same.

Analyses showed but very little difference even in the extremes in the purity and sucrose content of stripped and unstripped cane. The development of roots along the stalk also was found to have very little injurious effect, if any, on the sugar content and purity of the juice. In fiber content the unstripped cane was considerably lower than the stripped cane, showing that stripping had a general tendency to harden the cane and make it more fibrous. The difference in cost of production per ton in favor of unstripped cane was 11.5 cts.

Sweet potato work in 1908, T. E. KEITT (*South Carolina Sta. Bul. 146, pp. 3–21*).—Earlier work with the sweet potato by different experiment stations is reviewed, and the more recent work conducted by the South Carolina Station is noted. Descriptions are given of 14 different varieties which entered into this test. The results of work on starch content are reported, and the method of starch determination is described.

It was found that the water content in the different varieties of sweet potatoes examined varied as a rule from 65 to 69 per cent, and it appeared that if any considerable increase in this percentage took place there was a corresponding decrease in the starch content. Polo, Arkansas Beauty, and Yellow Nancemond, all varieties with over 72 per cent of water, contained below 15 per cent of starch. The leading varieties and the amounts of starch produced per acre were as follows: Southern Queen 4,443 lbs., Brazilian 4,148 lbs., Fulleton Yam 3,418 lbs., Pumpkin Yam 3,048 lbs., Nancy Hall 2,694 lbs., and Tennessee Notchleaf 2,629 lbs. Southern Queen and Brazilian are white, which is an advantage in starch manufacture, and they were also the two heaviest yielders in this experiment, Brazilian yielding 450 bu. and Southern Queen 416 bu. per acre. A study of the fermentable carbohydrates of the different varieties also puts Southern Queen and Brazilian in the lead, the theoretical yield in gallons of alcohol per acre being 473.5 and 462.2, respectively. The percentage of fermentable carbohydrates ranged from 18.62 in Polo to 27.15 in Shanghor Yam.

Sweet potatoes are considered a valuable feeding stuff, and it is pointed out that they may contain as high as 37 per cent of dry matter while 30 per cent is about the average. Estimating that under ordinary conditions land yielding 20 bu. of corn would be able to produce about 200 bu. of sweet potatoes, it is stated that the potatoes will furnish more than 3 times as much nitrogen-free extract and as much, or more, of each of the other proximate constituents of a feeding stuff as that contained in corn. Analysis of all the varieties did not disclose the presence of amids. The different varieties here tested gave an average yield of 250 bu. per acre, with the following average composition: 68.1 per cent of water, 1.6 per cent of protein, 0.5 per cent of fat, 0.9 per cent of fiber, 1 per cent of ash, and 27.9 per cent of nitrogen-free extract. The vines of 4 varieties calculated to the water-free basis contained an average of 12.48 per cent of protein, 4.86 per cent of fat, 18.22 per cent of fiber, 8.73 per cent of ash, and 55.71 per cent of nitrogen-free extract. This composition of sweet potato vines is compared with an average composition of the water-free material of red clover, crimson clover, and cowpea and soy bean hay.

In determining the fertilizing elements removed by a crop of sweet potatoes it was found that the crop removes about 4.3 cts. worth of phosphoric acid, nitrogen, and potash per bushel, or about $8.60 worth in a yield of 200 bu. per acre. A table is given showing the percentage composition in fertilizing ingredients of the moisture-free vines. A determination of the content of water, protein, starch, and sugar at different stages of growth seems to indicate that the sweet potato reaches maturity just about the time when the starch content is at its maximum and the sugars at their minimum.

Work at the tobacco experiment stations, E. H. MATHEWSON (*Virginia Sta. Rpt. 1908, pp. 27–39, figs. 10*).—This article is a review of the tobacco experiments conducted by the Virginia Station in cooperation with the Bureau of Plant Industry of this Department. Work is in progress at five stations upon the same general plan but modified sufficiently to be suited to the type of tobacco produced in the particular localities. The experiments include fertilizer, rotation, and tobacco breeding work. Some of the results here reported have already been noted from another source (E. S. R., 20, p. 33).

The use of potash was found more striking on the light, thin tobacco soil at Chatham than on the stronger and more clayey soil at Appomattox. It is stated that the finest and brightest tobacco was obtained only when the fertilizer mixture used contained relatively high proportions of phosphoric acid and, in the case of bright tobacco particularly, of potash also. A heavy application of nitrogen gave a striking increase in yield over either phosphoric acid or potash, but the tobacco was both coarser and darker. The result is regarded as showing that with heavy applications of nitrogenous manure adequate quantities of phosphoric acid and potash should also be applied in order to balance the application.

A general lesson brought out by the experiments is that the ordinary unimproved tobacco soil of Virginia is unproductive to a large extent at least because it supplies too little nitrogen to the growing crop. This may be remedied by the use of commercial fertilizers, barnyard manure, and the increase of the supply of humus by the growth of grasses and leguminous plants. The last method suggested requires the introduction of crop rotation, and to those in charge of the work it has become evident that the real solution of the problem lies in the diversification of crops or the introduction into the crop rotation of soil-improving crops, particularly the grasses and the leguminous plants.

Observations made on the residual effect of the fertilizer used on tobacco indicate that nearly all the soils in the tobacco-growing sections of the State can be made to produce excellent, profitable crops of hay and clover. The effect

of better methods of cultivation and crop management has also shown itself in increased yields of both dark and bright tobacco. Notes are given on the preparation of the soil and the care of the growing crop, tobacco breeding work, and field meetings. It is also pointed out that cowpeas are a most practical crop for the prevention of injury from cutworms and wireworms when planted immediately preceding tobacco.

The improvement of Wisconsin tobacco through seed selection, E. P. SANDSTEN (*Wisconsin Sta. Bul. 176, pp. 3–17, figs. 11*).—The work here discussed was begun in 1903 with the selection of a good type of Wisconsin-grown Connecticut-Havana seed regarded by leading buyers and growers as the most desirable type for the State. After 3 years' selection a pure type of tobacco with good leaves, fine texture, and large yielding qualities has been secured and seed of the type has been distributed to growers with success. Over 700 lbs. of this seed was distributed during the year.

It is recommended that the grower choose the best variety in his locality, mark the superior plants and preserve them for seed. The selection of individual plants should be based upon vigor, spread and shape of leaves, number and arrangement, prominence of midrib, texture and thinness, liability to produce suckers, color, and attachment of leaves to stem. Every growing crop should be culled and only the very best plants retained. Side shoots and suckers should be removed from selected plants and the main crop topped before the flowers expand, to prevent cross-fertilization with the seed plants. Stripping the seed plants is not recommended, as the leaves are needed to fully develop the seed.

Descriptions are further given on the harvesting and testing of tobacco seed, and the arrangement of a germinator is outlined.

The culture and selection of tobacco, L. TRABUT (*Gourt. Gén. Algérie, Dir. Agr., Serv. Bot. Bul. 46, pp. 22, figs. 20*).—In connection with a review of the work with tobacco at the station the author describes a number of hybrids and selected strains. In the breeding work with tobacco a number of American varieties have been used.

The ripening of different varieties of spring wheat as influenced by soil moisture content, VON SEELHORST and KRZYMOWSKI (*Jour. Landw., 57 (1909), No. 1, pp. 113, 114*).—In these experiments the water content of the soil in the various pots in which the grain was grown was kept at 40, 55, 70, and 85 per cent of complete saturation.

The results show that as the soil moisture was increased up to 70 per cent the ripening of the grain was retarded, this being brought out especially by a comparison of the data secured with 55 per cent and with 70 per cent of the water-holding capacity. With 85 per cent the plants ripened earlier than with 70 per cent. The earlier rapid growth on the soil given water to the extent of 85 per cent of saturation exhausted the supply of nitrogen sooner than did the growth in the other test and in this way was brought about the earlier maturity. The comparative yields obtained with 70 per cent and 85 per cent of saturation were 62.4 gm. and 89.4 gm., respectively.

The maximum difference in the average ripening periods was 7.5 days. In time of ripening the several varieties differed widely under the influence of varying soil moisture content. On the drier soils this difference was small, while on those higher in moisture it was greater. Noe and Schlanstedt wheat remained green much longer than Galician Club, and Iden stood between them in this respect. It was found that the water content of the soil can have so great an influence on the ripening period that the varietal characteristics in this regard are entirely obliterated.

The root systems of different varieties of spring wheat, VON SEELHORST and KRZYMOWSKI (*Jour. Landw., 57 (1909), No. 1, p. 115*).—Observations made in connection with the experiments described in the previous abstract indicated that the high yielding sorts have larger root systems than those of lower productivity and that Schlanstedt wheat has this character developed to a marked degree.

Résumé of experiments on the development of wheat on the black soils of Southern Russia, T. LOKOT (*Zap. Novo-Aleksandri. Inst. Selsk. Khoz. i Lyesov., 19 (1908), No. 3, pp. 157–165*).—Pot culture and field tests showed that in deep and moist black soil a rank growth of the stems and leaves took place, while the development of the grain was comparatively small. It was observed that the evaporation of moisture from the wheat plant is relatively the greatest in its first stages of growth, and that at the moment of its most rapid development, about the time when the heads begin to form, evaporation is relatively the smallest. At the ripening of the grain the quantity of moisture passing through the plant again increases. The quantity of water evaporated was approximately 450 gm. for each gram of dry matter produced.

Moisture content and shrinkage in grain, J. W. T. DUVEL (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 32, pp. 13*).—This bulletin discusses the loss of weight in handling grain and the reduction of moisture and shrinkage, and points out why the reduction of moisture and the shrinkage in grain are not the same and how the difference between the reduction of moisture and the shrinkage can be determined. For the purpose of this determination tables are arranged, with the necessary explanation.

Report of the Nebraska seed laboratory, E. M. WILCOX and NELLE STEVENSON (*Nebraska Sta. Bul. 110, pp. 5–29, figs. 12*).—This bulletin contains a statement regarding the work of the seed laboratory from January, 1908, when it was established, to May 1, 1909. During this time 463 samples were received and 636 different tests were made during the first year, and 617 samples received and 950 tests made during the second year. Over 50 per cent of the samples were received from Nebraska. A table gives the results of tests and examination of samples received up to July 1, 1908.

In 201 samples of alfalfa examined the purity varied from 56 to 99 per cent, the germination from 56 to 100 per cent, the inert matter from 0.1 to 12 per cent, and the foreign seed from 0 to 36 per cent. One sample contained over 9 per cent of dodder. Buckhorn, wild carrot, wild chicory, lamb's quarters, and the seeds of about 75 other weeds were also found in the samples.

The purity of 61 samples of red clover examined varied from 75 to 99 per cent, the germination from 67 to 100 per cent, the inert matter from 0.3 to 12 per cent, and the foreign seed from 0.1 to 22 per cent. Clover dodder seeds were found in 8 of the samples, and over 70 other more or less noxious weed seeds were also present. Buckhorn was present in nearly 50 per cent of the clover samples examined.

Twenty-six samples of awnless brome grass were examined, and these varied in purity from 33 to 96 per cent, in germination from 0 to 86 per cent, in inert matter from 2 to 46 per cent, and in foreign seed from 0.1 to 56 per cent. Wheat grass was most abundant in the brome grass seed, and common cheat and other sorts of brome grass of little or no value were also found.

Some of the more common and injurious weeds of the State are described and figured.

The killing of mustard and other noxious weeds in grain fields by the use of iron sulphate, E. W. OLIVE (*South Dakota Sta. Bul. 112, pp. 485–498, figs. 3*).—A general description of the method of killing weeds, particularly

wild mustard, by spraying with iron sulphate solution is given and the results obtained at the station and elsewhere are briefly reported. The solution used was of about 20 per cent strength.

It is found that the best results from spraying are obtained when the grain and the weeds are from about 6 to 10 in. high, or just before the mustard plants begin to bloom. In several of the tests the work of spraying was conducted at the rate of 25 acres in 5 hours. It is stated that a powerful pressure is absolutely necessary in order to develop the proper fineness of spray, and that favorable weather is also highly important. Spraying just after the dew is off on a bright sunshiny day is considered most favorable to successful work. A description of successive steps in the appearance of sprayed leaves is given and the physiological action of the sulphate is interpreted. "The main action involved seems to be that the water in the leaf is drawn out of the cells by the flakes of salt dried on the surface."

The grain suffered a little setback but permanent injury did not result on account of their indeterminate growth which left only the tips of the older leaves exposed to the action of the sulphate. The following weeds were entirely killed under favorable conditions of spraying: Wild mustard (*Brassica arvensis*), ragweed (*Ambrosia artemisiæfolia*), king-head or greater ragweed (*A. trifida*), bind weed (*Convolvulus sepium*), marsh elder (*Iva xanthifolia*), milkweed (*Asclepias* sp.), peppergrass (*Lepidium virginicum*), pigweed (*Amarantus* sp.), and sweet clover (*Melilotus alba* and *M. officinalis*). Those more or less badly injured included Russian thistle (*Salsola kali tragus*), sunflower (*Helianthus* sp.), dandelion dock (*Rumex crispus*), thistle (*Carduus* sp.), white clover (*Trifolium repens*), red clover (*T. pratense*), and alfalfa (*Medicago sativa*). The results of spraying for the eradication of dandelions were not so favorable as those reported by other experimenters. Young plants with a small root were generally entirely killed with only 1 application, but large strong plants required 3 and even more applications at intervals of 3 or 4 weeks. Cutting off the crown of dandelion plants and applying a 20 per cent sulphuric acid solution to the cut surface generally killed the dandelions. Kerosene applied in a similar manner also caused the roots to decay, but gasoline was without effect.

According to an estimate given the total cost of spraying 300 acres is approximately $1.25 per acre.

Weed work, H. L. Bolley (*North Dakota Sta. Rpt. 1908, pt. 1, pp. 42–44*).—A general review of the weed work carried on by the station is presented.

The work of spraying the lawns of the college campus with iron sulphate to reduce the growth of dandelions is described. On the sprayed areas no dandelions produced seed and many of the large roots totally disappeared, while young plants coming from seed were completely destroyed. The sprayed lawns made a strong growth of grass through the season. This better growth was apparently associated with a deeper green in the color of the grass, which result was found to be largely due to the elimination of certain destructive parasitic diseases of blue grass, such as common mildew, smut, common rust, and other less common parasitic enemies.

In summarizing the results the belief is expressed that iron sulphate or copper sprays increase chlorophyll production under certain conditions, and that the spraying of a wheat crop improves the growth by leaving the crop more open to light and air at the proper time. The sprays showed themselves to be destructive to germinating spores and parasitic fungi. Certain elements of proper weed destroyers have a fertilizing value. Some of the substances may act as growth stimulants, and some of the sprays seem to extend the period of vegetation as observed with the spraying of wheat, oats, and lawn grasses.

HORTICULTURE.

Cabbage experiments and culture, C. P. Close and T. H. White (*Maryland Sta. Bul. 133, pp. 175–199, figs. 4*).—An account is given of cultural and variety tests together with general directions for the culture and care of cabbage and a discussion by H. J. Patterson on the chemical composition of the cabbage plant, this discussion being based upon analyses made in 1893 but not hitherto published.

The authors being of the opinion that the susceptibility to rot and disease of cabbages growing on very rich, highly cultivated land is due more to something unsuitable in the soil rather than to the direct attacks of bacteria or fungi, a study was made to determine the effect of stable manure, of various chemical fertilizers, and of different cultural treatments, such as ridge planting, level planting, and proper drainage as correctives of the condition favoring the development of cabbage diseases. The experiments were conducted for three seasons upon a piece of rather stiff clay land that had been manured and planted to truck crops for many years, and upon which cabbage had previously rotted badly. The various treatments given failed to act as correctives of the supposed excessive salts or poisonous matter in the soil. Good cabbages, on the other hand, were grown on soils of the same character and drainage conditions with the exception that the land had been in sod from which hay had been cut. It is concluded that whereas early cabbages do best on soils that are rich and full of humus, late cabbages generally do best on a sod field broken early in the spring and well manured.

The varieties tested are classed into 3 general types relative to their disease resistance. The disease-resistant stock all appeared to conform to one type of vigorous growth with green or purplish-green curled and crinkled leaves. This type was found to be quite disease resistant and hardy, remaining in the field throughout the winter, and producing seed in the spring. Cabbages of the Savoy type were also fairly disease resistant, standing conditions that usually destroyed cabbage of the ordinary Flat Dutch type. The ball-headed varieties were most subject to disease.

A comparative test of low priced and high priced fertilizers indicated that the former sometimes give as good results as the latter. It appears, however, that the same results can not be expected from any particular brand of fertilizer under all conditions of soil and seasons. On the whole, the use of a fertilizer with a high nitrogen content is recommended. In raising late cabbage plants many growers are in the habit of using a piece of poor light soil for a seed bed, to which is applied a very liberal dressing of commercial fertilizers. This appears to produce toughened plants quite resistant to checks from transplanting. Experiments were conducted for two years to determine a fertilizer suitable for this purpose. The results indicate that it is profitable to use nitrate of soda on the plant beds at the rate of 450 to 600 lbs. per acre.

Variety tests of French and American cabbages have been carried on for several years. The names and average weights in pounds and ounces per head, together with remarks on the general character of each variety, are given.

With an analysis of the dry matter and principal mineral constitutents of different parts of the mature cabbage plant as a basis it is estimated that an acre of cabbage yielding 4,000 mature heads and 500 immature plants will remove from the soil 11.6 lbs. of phosphoric acid, 57 lbs. of potash and 33.5 lbs. of nitrogen.

Growing better gems, J. Troop and C. G. Woodbury (*Indiana Sta. Bul. 135, pp. 3–11, figs. 8*).—A further report on investigations being conducted by the station with a view of improving the Indiana cantaloup industry (E. S. R., 19,

p. 1038). The results of field-spraying experiments on a commercial scale to determine the value and effect of Bordeaux mixture as a rust preventive are given, together with suggestions for improving the type of the Indiana melon, including a description of an ideal type of Netted Gem for that section.

The spraying experiments were conducted in 1908, the experimental plat being 5.31 acres in extent of which a little over 3½ acres were sprayed. The 5:5:50 Bordeaux formula was used and 5 sprayings were given on June 18 and 25, July 9, 21, and 28, respectively. Altogether the season was not especially favorable for rust development, nevertheless 366.99 crates of melons were picked from the sprayed portion and 306.93 crates from the unsprayed portion, thus showing an increase of approximately 17 crates per acre due to spraying. The estimated net profit in favor of spraying was $11.49 per acre, with cantaloup prices much lower than in 1907.

The rust-resistant melon developed by the Colorado Station (E. S. R., 19, p. 944) was tested in Indiana in 1907, and gave melons of fine quality and markedly resistant to the rust fungus, although they were 2 weeks later in ripening than the Indiana crop, and rather too large for successful marketing. This strain is to be further developed under Indiana conditions with a view of selecting for earliness, retaining at the same time the rust-resistant quality.

Varietal study of sweet corn, H. L. Price and A. W. Drinkard, Jr. (*Virginia Sta. Rpt. 1908, pp. 95–99*).—Notes are given on the behavior of 57 varieties of sweet corn tested at the station during the last 4 years, together with lists of the best early, mid-season, late, and canning varieties.

Growing onions from seed, J. Troop and C. G. Woodbury (*Indiana Sta. Circ. 15, pp. 22, figs. 13*).—This circular discusses the culture of onions from seed in northern Indiana. Consideration is given to the soil and its preparation, fertilizing, seeding and cultivating, harvesting, storing, and marketing, cost of growing, yields and profits. A note is also given on the onion maggot and its control.

Varietal study of tomatoes, H. L. Price and A. W. Drinkard, Jr. (*Virginia Sta. Rpt. 1908, pp. 89–95*).—Brief notes are given on the general behavior and value of 91 varieties of tomatoes tested at the station during the seasons of 1906–7, together with lists of varieties recommended for early, main crop, canning and preserving purposes, as well as the best dwarf and yellow varieties.

Missouri apple growing, J. C. Whitten (*Missouri Sta. Circ. Inform. 32, pp. 14, figs. 2*).—This circular contains popular directions for growing apples, including a discussion of soils and locations, varieties, preparation of land, selecting trees, planting, pruning, cultivation, diseases, picking and packing.

First report on the culture and analyses of French cider apples in Virginia, H. L. Price and W. B. Ellett (*Virginia Sta. Rpt. 1908, pp. 39–54, figs. 17*).—The chemical and horticultural departments of the station have carried on cooperative studies of the French varieties of cider apples for the past 8 years, and are of the opinion that this group of apples has such distinct economic value as to receive a place in American orcharding. Their characteristic prolificacy as well as the high sugar and tannin content appear to hold when grown under our soil and climatic conditions. The fruits of a large number of the French varieties are described and illustrated, and tabular data are reported showing the results of chemical analysis of the must and the whole apple of most of these varieties.

The olive and the oils of the Province of Catania, E. de Cillis (*Ist. Agr. Siciliano "Valdisavoja" Relaz. 1906–1908, pp. 157–216*).—The results of an extensive survey of the olive industry of the Province of Catania are given.

The phases reported and discussed include the extent and area of production, varieties grown, cultural details, harvesting, conservation and preservation of

olives, and the details of the manufacture of olive oils. Considerable data were also collected on the fruits of the varieties under observation relative to their weight, volume, specific gravity, length, thickness, and the relative proportions of skin, pulp, endocarp and seeds, and the varieties are ranked according to the measurements thus secured. Physical and chemical analyses of the oils are also reported. The author points out present deficiencies both in methods of culture and in the processes of manufacturing the oils, with a view to strengthening the industry in Catania.

Effects of annular decortication on peaches, F. Calzolari and A. Manaresi (*Staz. Sper. Agr. Ital., 42 (1909), Nos. 4–6, pp. 233–272*).—Part 1 of this article consists of a general review of the present knowledge relative to the effects of annular decortication or ringing as gleaned from various experiments with grapes, including a bibliography of the subject. In part 2 a detailed account is given of ringing experiments conducted by the authors with peaches. When the operation was properly carried out the fruit on the ringed branches matured about a week earlier and averaged from 8 to 11 gm. heavier than the fruit from unringed branches of the same tree.

Analyses were made of the fresh pulp and dry substance of the fruit, from which it appears that ringing also exerts some influence on the chemical constituents of the fruit, the most important change being an increase in the reduced sugar (glucose and levulose) content. Data are also given showing the effect of ringing on the growth of the branches.

Hardiness of peach buds, blossoms, and young fruits as influenced by the care of the orchard, W. H. Chandler (*Missouri Sta. Circ. Inform. 31, pp. 31, figs. 11*).—A popular discussion based upon the author's observations and investigations along this line, a full account of which has been previously noted (E. S. R., 19, p. 237).

Variety test of peaches, O. M. Morris (*Oklahoma Sta. Bul. 84, pp. 6, fig. 1*).—In this bulletin notes are given on the condition and character of some 37 varieties of peaches tested in the station orchards. All reliable information that could be obtained relative to the characteristics, qualities, and success or failure of each variety has been included in the notes.

Japan plum Pathfinder, W. Strang (*Rural New Yorker, 68 (1909), No. 4008, p. 752, fig. 1*).—A Japan hybrid plum produced by crossing Chabot and Wickson is illustrated. The fruit of this variety, which has been named Pathfinder, is said to be firm, very fine grained, and sweet when fully ripe.

Origin and importance of the Scuppernong and other Muscadine grapes, F. C. Reimer (*North Carolina Sta. Bul. 201, pp. 5–21, figs. 7*).—In this bulletin the author presents considerable data relative to the history of the Scuppernong and other important varieties of *Vitis rotundifolia*. The importance and characteristics of these varieties are also discussed, and lists are given of those recommended for home use, wine, unfermented grape juice, and for general market.

Certain varieties of *V. rotundifolia* appear to be self-sterile. Studies are being made to determine to what extent and under what conditions this is true. As tested for one season in one section of the State, the author found the Scuppernong and Flowers varieties to be self-sterile. A large number of flower clusters of these varieties were covered with paper bags before the flowers opened and not a single fruit was set. Other flower clusters on the same Scuppernong vines were similarly covered, but later when the stigmas became receptive a flower cluster from a male vine was tied to each of the enclosed flower clusters, three-fifths of which matured normal size clusters of fruit.

Fruits recommended by the American Pomological Society for cultivation in the various sections of the United States and Canada (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 151, pp. 69, pl. 1*).—This is the third revised catalogue of fruits which has been prepared jointly by this Department and the American Pomological Society, and is similar in character, scope, and general plan to its predecessors (E. S. R., 11, p. 544). An effort has been made in the present edition in determining the behavior of different varieties to secure evidence not only of experts, but of the masses of practical fruit growers as well. Owing to the rapid expansion of the fruit industry in this country, the lists of desirable varieties have been considerably extended.

On Coffea robusta and Bukoba coffee (Coffea bukobensis), A. Zimmerman (*Pflanzer, 4 (1908), No. 21, pp. 321–329*).—With the view of arousing the interest of Amani coffee growers in these two species of coffee, which are now extensively grown in Java, a short account is given relative to their botany, climatic and soil requirements, culture, susceptibility to diseases and other injuries, yields, and the quality of the product. A brief bibliography is appended.

Hotbeds and cold frames; their preparation and management, W. L. Howard (*Missouri Sta. Circ. Inform. 33, pp. 19, figs. 11*).—In addition to directions relative to the preparation and management of hotbeds and cold frames, suggestions are given on their use in growing different kinds of vegetables and flowers.

The vegetable garden, Ida D. Bennett (*New York, 1908, pp. X+260, pls. 16*).—This is a popular treatise on vegetable gardening, discussing the sanitary and economic value of the kitchen garden, locating and planning the garden, the maintenance of soil fertility, the construction and care of hotbeds, cold frames and pits, various garden operations, and garden tools, and giving details for the culture of all classes of vegetables. Following the cultural directions for each vegetable are directions for preparing it in different ways for the table. The concluding chapters discuss garden enemies and their control and fall work in the garden. A practical planting table for vegetables is appended.

The farmer's home garden, A. L. Dacy (*West Virginia Sta. Bul. 122, pp. 373–404, figs. 2, dgm. 1*).—This is a brief popular discussion of the general principles of garden making, the necessary equipment, selection of seeds and plants, planting operations, etc., and giving cultural hints for growing all of the ordinary vegetables and small fruits. A planting plan is also given for a garden 136 by 160 ft. in area.

Biggle orchard book, J. Biggle (*Philadelphia, 1908, 2. ed., pp. 144, pls. 21, figs. 108*).—A condensed pocket guide to the culture of the common orchard fruits, including the apple, cherry, peach, pear, plum, quince, and dwarf pear, together with briefer notes on nuts, citrus, and other semitropical fruits. The important phases discussed are planning and starting an orchard, nursery and planting practices, varieties, pruning, cultivation and fertilization, thinning, spraying, cover crop planting, picking, grading and packing, cold storage and marketing. The text is fully illustrated.

Orcharding in east Tennessee, C. A. Keffer (*Bien. Rpt. Tenn. Dept. Agr., 1907–8, pp. 224–250*).—This is a report of a three months' study relative to the status of fruit growing in east Tennessee, together with a discussion of the requisites for commercial orcharding and the care of orchards.

The suburbanite's handbook of dwarf fruit tree culture, their training and management, with a discussion on their adaptability to the requirements of the commercial orchardist, both in connection and in competition with standard trees, A. W. Thornton (*Bellingham, Wash., 1909, pp. 115, figs. 67*).

The garden yard; a handbook of intensive farming, B. HALL (*Philadelphia, 1909, pp. XV+321, pls. 4*).—A popular treatise, discussing in considerable detail intensive vegetable culture, including also chapters on small-fruit culture, poultry management, and farm organization. General garden operations and problems are grouped together and discussed in part 1. Part 2 contains details for growing the various vegetables, which are grouped together in classes, such as root crops, tuber crops, bulb crops, cole crops, etc.

The book of the cottage garden, C. THONGER (*New York and London, 1909, pp. 90, pls. 18*).—A popular work on suburban gardening, treating in its successive chapters the cottage garden, lawns and grass plats, hardy flower borders, annuals and biennials, roses, the reserve garden, garden color, fragrance, the vegetable garden, and the orchard garden.

Little gardens and how to make the most of them, H. H. THOMAS (*New York and London, 1909, pp. 152, figs. 155*).—A popular treatise on the culture of flowers, shrubs, vegetables, and fruits in gardens of limited area, including also information relative to planting and arranging the garden and the selection of varieties.

A little Maryland garden, HELEN A. HAYS (*New York and London, 1909, pp. 201, pls. 8*).—A popular account of the author's experience in garden making, containing many suggestions relative to garden designing, the kinds of flowers to use, and cultural operations for different seasons of the year. The text is accompanied by several color plates portraying garden scenes.

The summer garden of pleasure, HENRIETTA M. BATSON (*Chicago and London, 1909, pp. XIV+231, pls. 36*).—This popular garden book is intended primarily for persons restricted to the culture of border gardens. It discusses in particular the subject of color schemes, and the selection of suitable varieties for maintaining a supply of flowers throughout the summer months. The discussion relative to color arrangement is illustrated by a number of plates of actual groups and borders.

House plants and how to grow them, P. T. BARNES (*New York, 1909, pp. X+236, pls. 31*).—This popular work treats of the culture and care of house plants of various kinds, those plants which are generally successful being discussed more fully. Detailed directions are given for the preparation of the soil, seed sowing, and other cultural operations. Particular regard is given to the temperature requirements of the various plants. The work concludes with a chapter on ether forcing without a greenhouse, and a window gardener's calendar.

Sweet peas and how to grow them, H. H. THOMAS (*New York and London, 1909, pp. 112, figs. 54*).—A popular guide to the culture of sweet peas for home, garden, and exhibition purposes, including information relative to varieties for different purposes and seasons and raising new sweet peas, as well as chapters on cautions to sweet-pea growers, replies to questions, and insect pests and diseases.

FORESTRY.

The relation between germination percentage and the intrinsic value of pine seeds. Storing pine seed for several years without injury to the germination percentage, HAACK (*Ztschr. Forst u. Jagdw., 41 (1909), No. 6, pp. 353-381, fig. 1, dgms. 6*).—In previous germination tests (E. S. R., 18, p. 147) of pine seed carried on both in the laboratory and in the open, the author found that the germinative power of any given lot of pine seed was not an accurate measure of the number of plants which result from the seed, and also, that of two lots of seed having the same germinative power, the one possessing the higher germinative energy produced the larger number of

plants in the open. With data secured from these investigations as well as from more recent work, he has worked out a set of tables and curves showing the relation between seeds with various germinative powers and the number of yearling plants produced; the plant percentage (the number of yearling plants produced from 100 seeds) being used as a function of the germination percentage and the relations traced out for seed grown in the open under favorable, unfavorable, partially favorable, and average conditions affecting growth.

The author finds from his investigations that the higher values of the germination percentages show strikingly higher plant percentages than the lower values for the germination percentages. On this account he is of the opinion that a mixture of seed of various germination percentages is of equal value with an unmixed seed possessing the same germination percentage as the mixture, and that the tendency is even toward a higher plant percentage in the mixture than in the unmixed seed. Although germination percentage is not a good measure for determining plant percentage, germination energy and plant percentage appear to make similar variations. Since seed of first-class germinative power is often too high priced for the grower, it would appear that the seedsmen are justified in mixing these seed with cheaper seed of lower germinative power, provided the mixture shows a fair plant percentage. The adaptation of the described tables and curves in making such mixtures and in determining their market value is discussed and the author's methods of carrying on germination tests are described.

In continuation of previous investigations (E. S. R., 17, p. 370) studies were made relative to the best methods of storing seed in order to prevent a decrease of germinative power. The work, which is described in detail, includes studies of temperature and moisture conditions, and of seed placed in air-tight receptacles as compared with seeds exposed to the air. Seed which were stored in air-tight receptacles gave after 2 to 3 years' storage from 2 to 3 times the plant percentage of similar seed exposed to the air during storage, with a corresponding increase in money value. Thus it appears that by storing seed under air-tight conditions seedsmen will be enabled to lay in large supplies of seed in years when the quantity and quality are high. Nothing is to be gained by storing the seed longer than 3 years.

Before storing the seed in air-tight receptacles, the author recommends that it should be dried out in a temperature of from 30 to 40° C. until it has lost from 1 to 2 per cent of its weight. The seed should then be placed in thoroughly dry air-tight receptacles, which, when large quantities of seed are to be stored, can be made of tin and soldered at the joints. As experimentally determined, the development of carbonic acid from seed respiration in the receptacles does not appear to be sufficient to injure the seed. It is recommended, however, that a small quantity of quicklime be inclosed, about 1 gm. being sufficient to assimilate 400 cc. of CO_2. Although the seed stored in air-tight receptacles at various temperatures gave in every case far better results than seed stored at similar temperatures but exposed to air, storing the seed in an ice house gave the most favorable results. For practical purposes, however, the use of a deep cool cellar is recommended.

Further fertilizer experiments with forest seedlings on sandstone soils and observations on the carrying out of forest seed experiments. II. Vater (*Tharand. Forstl. Jahrb.*, *59* (*1909*), *No. 1, pp. 93–121*).—In continuation of previous work (E. S. R., 17, p. 772) fertilizer experiments with forest seedlings on sandstone soil are reported in detail.

Seedlings of the common pine were used in the work. The highest growth yield was obtained by the use of a complete fertilizer in which kainit was the

source of the potash. As compared with kainit, muriate of potash and sulphate of potash as sources of potash gave a growth performance of only 90 per cent. The use of a fertilizer without potash, however, indicated that the soils upon which the seedlings were grown were only slightly deficient in potash, since in this case a growth yield of 89 per cent was obtained.

Lime used in conjunction with the original soil cover, the latter being incorporated into the seed bed to a depth of 10 in. gave a growth yield of only 55 per cent. When lime was used alone the growth yield was only 36 per cent. A growth yield of 42 per cent was obtained where the soil cover was incorporated without any other fertilizer as compared with a growth yield of 33 per cent where the soil cover was removed and no fertilizer used.

On the influence of cultural methods on the yield of the common pine, M. Kunze (*Tharand. Forstl. Jahrb., 59 (1909), No. 1, pp. 1–26*).—In continuation of previous thinning and wood volume investigations to which reference is made in the article, some further measurements are given which were taken at the time of the sixth thinning of some experimental pine stands in Saxony, and which were designed to show the effect of various cultural treatments on the yield of the pine.

Properties and uses of the southern pines, H. S. Betts (*U. S. Dept. Agr., Forest Serv. Circ. 164, pp. 30, figs. 6*).—This circular contains an account of the southern pines relative to their nomenclature, botany, distribution, enemies, physical and mechanical properties, and utilization. The results of several mechanical tests of structural material and of small pieces are given, considerable of the data being based upon previous publications of the Forest Service (E. S. R., 9, p. 842; 19, p. 651).

Experiments on the effect of the soil of the hemlock grove of the New York Botanical Garden upon seedlings, Winifred J. Robinson (*Jour. N. Y. Bot. Gard., 10 (1909), No. 112, pp. 81–87, fig. 1*).—The data are given of a series of experiments conducted for the past 3 years in the New York Botanical Garden to determine whether any chemical constituent of the soil in the hemlock grove was the detrimental factor causing the commonly noted failure of hemlock seedlings to develop. From the data secured it appears that the failure of the seedlings to germinate beneath the adult trees is not due to a special toxic constituent of the soil, but rather to such factors as the amount of moisture and light and to the physical condition of the soil caused by the mat of hemlock needles that accumulates beneath the trees.

Paper birch in the Northeast, S. T. Dana (*U. S. Dept. Agr., Forest Serv. Circ. 163, pp. 37, figs. 2*).—An account is given of the paper birch (*Betula papyrifera*) relative to its importance and uses, distribution and supply, botanical and silvical characteristics, methods of lumbering and systems of management together with a map showing the distribution of paper birch in commercial quantities in the Northeast, and several diameter, volume and yield tables based on measurements of a large number of trees. The author concludes that under prevailing forest conditions the supply of paper birch will not be exhausted for a good many years.

The tree-cotton or kapok tree (Eriodendron anfractuosum), M. Mücke (*Pflanzer, 4 (1908), Nos. 19, pp. 289–300; 20, pp. 305–319*).—An account is given of this tree relative to its botany and culture, the harvesting and preparation of kapok cotton and kapok oil, the microscopical, chemical, and physical properties of these products, the uses of kapok, its adulteration, yields, prices received, and other statistics of the industry. A bibliography of this species is appended.

The balata industry in Surinam, D. Fock (*De Balata-industrie in Suriname. Paramaribo, [1909], pp. X+66+CIX+67+98, dgm. 1*).—In part 1 of this book are brought together a number of government reports of various dates making as a

whole a historical review of the balata industry in Surinam. Part 2 contains a discussion relative to the distribution of balata-yielding trees, methods of tapping the trees, and coagulating the latex, as well as a general account of the industry. Part 3 discusses the chemistry, falsification, and uses of balata.

New facts on the Bleekrodea tonkinensis, DUBARD and EBERHARDT (*Bul. Econ. Indo-Chine, n. ser., 11 (1908), No. 74, pp. 520–522*).—As a result of recent observations relative to this new species of rubber tree (E. S. R., 20, p. 152), which is locally known in Tonkin as Teo-Nong, the authors find that it extends over a much larger area than first supposed. Its geographic distribution in North Indo-China, together with the influence of the seasons and temperature on the flow of its latex, is here discussed.

Rubber from Southern India (*Bul. Imp. Inst., 7 (1909), No. 2, pp. 163–166*).—Analyses are reported of samples of rubber prepared from Ceara, Castilloa, and Para trees growing in the government experimental gardens at Kullar and Burliar in the Nilgiri Hills.

Trees of commerce, W. STEVENSON (*London, 1908, rev. ed., pp. XII+274*).—This work, which is largely a condensation of the information on commercial trees contained in the scattered literature on the subject, first appeared in 1894. The present edition has been revised to include more recent information. All of the commercially important hardwoods are considered relative to their distinguishing characteristics, geography, commercial distribution, and the properties and uses of their timber.

The timber supply of the United States, R. S. KELLOGG (*U. S. Dept. Agr., Forest Serv. Circ. 166, pp. 24, figs. 6*).—This circular discusses the extent of our forest resources, their ownership, the rate at which they are being cut, and the outlook for the future timber supply. Approximate estimates are given of the original and present forest areas and stands, together with stumpage estimates of the principal species and the statistics of the cut and value of lumber and other forest products, the data being drawn from various Government and outside sources. The original forest area is esitmated at about 856,690,000 acres or about 45 per cent of the total land area of this country, whereas the present forest area is estimated at about 544,250,000 acres or about 29 per cent of our total land area.

Forest products of the United States, 1907 (*Bur. of the Census [U. S.], Forest Products 10, pp. 122, dgms. 3*).—This bulletin contains statistical data compiled by the Bureau of the Census in cooperation with the Forest Service of this Department relative to the production of lumber, lath, and shingles, the cross-ties purchased, the consumption of pulp wood, tan bark and tanning extracts, the production of slack and tight cooperage stock, number of poles purchased, wood consumed in veneer manufacture, wood distillation, pine distillation, and exports of forest products in 1907.

The total value of products taken from the forests of the United States during the calendar year 1907 approximates $1,280,000,000 in value at the point of production. This is an increase of $80,000,000 over the corresponding total for 1906, but the increase appears to be due more to a greater valuation of products rather than to a greater production in 1907.

Practical assistance to owners of forest land and to tree planters (*U. S. Dept. Agr., Forest Serv. Circ. 165, pp. 7*).—This circular combines and supersedes Circulars 21 and 22 of the same series (E. S. R., 10, p. 443; 11, p. 745). It discusses the aims and nature of assistance given and contains the regulations governing cooperation with private owners, together with sample application forms.

The wood commerce of the Saxon railroads in the years 1883–1907, inclusive, F. MAMMEN (*Sachs. Holzverkehr u. Holzhandel Einzeldarstell., 1909, pt. 1,*

pp. 228, charts 10).—This is the first of a series of statistical publications to be issued on the total wood commerce and trade of Saxony.

Detailed statistical returns are given for bark, dyewoods, timber, and timber products, paper, and miscellaneous forest products showing the Saxon shipments, receipts, and interior trade in these products over the Saxon railroads. The tables give yearly returns from 1883 to 1907, the monthly returns from January to June of the year 1883, and quarterly returns for each year for the period 1883–1897. The appendixes contain several decrees relative to the collection of commercial statistics, blank forms showing how these statistics are gathered, and several platted curves showing the fluctuation in the commerce of the important forest products for the period.

The net revenues of the Saxon state forests for the year 1907, A. Bruhm (*Tharand. Forstl. Jahrb., 59 (1909), No. 1, pp. 78–92*).—A statistical report relative to the yields and financial returns from timber and minor forest products in the Saxon State forest in 1907.

A report on forest management in Italy during the biennial period 1906–7 (*Bol. Min. Agr., Indus. e Com.* [*Rome*], *8 (1909), Ser. A, No. 5, pp. 65–73*).—A statistical report on the government forest operations in the various provinces of Italy for the biennial period 1906–7.

Annual progress report of forest administration in the western and eastern circles of the United Provinces for the forest year 1907–8, B. B. Osmaston and H. Jackson (*Ann. Rpt. Forest Admin. West. and East. Circles* [*India*], *1907–8, pp. 18+6+II+18+XCVII+5*).—The usual annual statements relative to the constitution, management, and exploitation of the State forests in the western and eastern circles of the United Provinces, including financial statements for the year. The important data are presented in tabular form.

Report on the forest administration of the Central Provinces for the year 1907–8, A. F. Gradon et al., A. G. Hobart-Hampden and C. G. Rogers (*Rpt. Forest Admin. Cent. Prov.* [*India*], *1907–8, pp. 6+17+20+20+LXX*).—Reports similar to the above are given by the respective conservators of State forests in the northern, southern, and Berar circles of the Central Provinces for the year 1907–8.

Annual report on the literature and important happenings in the realm of scientific forestry, forest zoology, agricultural chemistry, meteorology, and forest botany for the year 1908, H. Weber (*Allg. Forst u. Jagd Ztg., 1909, Sup., pp. 107*).—As in previous years (E. S. R., 20, p. 646), this supplement contains abstracts of the important literature on the various phases of forestry, together with notes on important occurrences in the forest world for the year 1908. The topics included are silviculture, utilization, management, valuation and statics, the theory of forest mensuration and yields, administration, history, policy, statistics, news of forest unions and hunting clubs, zoology, botany, and soil physics.

DISEASES OF PLANTS.

The loose smuts of barley and wheat, E. M. Freeman and E. C. Johnson (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 152, pp. 48, pls. 6, figs. 2*).—An account is given of investigations on the loose smut of barley (*Ustilago nuda*) and loose smut of wheat (*U. tritici*).

The life histories of these smuts are described at considerable length, and the results of a number of inoculation and other experiments are given. Investigations were conducted for the control of these smuts. The authors state that the smuts of wheat and barley are widely distributed, and demand treatment in many sections of the United States on account of the extensive

injury done to the crops. The loose smuts of wheat, barley, and wild barley are distinct species and are not interchangeable as to their host plants. The loose smuts of wheat and barley infect the plant in the flowering stage, entering the embryo inside of the ovary before the latter ripens into the seed. This infected seed will develop a smutted plant if sown. Varietal differences in susceptibility to smuts have been observed in both wheat and barley, but no marked immunity has yet been discovered.

The best method for preventing these smuts is said to be the modified hot-water treatment, which consists for barley of soaking in cold water for 5 hours, followed by 15 minutes in water heated to 52° C.; while for wheat after soaking for the same time in cold water the grain should be soaked in hot water for 10 minutes at a temperature of 54° C. The application of this method is slightly injurious to the germinative power of the grain, and as a consequence a somewhat larger amount should be sown; otherwise there will be a slight decrease in yield.

Smut and rust of cereals and their prevention, O. KIRCHNER (*Illus. Landw. Ztg., 29 (1909), No. 30, pp. 305, 306*).—Popular accounts are given of the smuts and rusts of cereals, with suggestions for reducing the loss due to these parasites. The methods recommended consist of seed treatment with copper sulphate, hot water, or formalin for smut prevention, and the selection of resistant varieties for rust prevention. The relative resistance of a number of varieties of winter and summer wheats is shown.

The wintering of parasitic fungi, and combating their attacks, E. RIEHM (*Deut. Landw. Presse, 36 (1909), No. 35, pp. 373, 374*).—A popular account is given of the means by which a number of the more common fungi that cause plant diseases are carried over winter, with particular reference to those carried from crop to crop by seed. For the prevention of seed infection treatment with fungicides is recommended, and descriptions are given of the formalin and hot-water methods of treating wheat and oats for smut.

The fungus and insect enemies of beets, P. ULRICH (*Illus. Landw. Ztg., 29 (1909), No. 38, pp. 377, 378, figs. 11*).—Popular descriptions are given of the beet rust, leaf spot, mildew, scab, dry rot, heart rot, nematodes, and leaf beetles.

Root tumors on sugar beets, J. REINELT (*Bl. Zuckerrübenbau, 16 (1909), Nos. 5, pp. 68–73; 6, pp. 81–87*).—It is stated that at harvest beets are often found with irregular swellings, varying from the size of a hazelnut to others weighing as much as 1.5 kg.

The author has investigated the subject to determine the cause of the trouble if possible. In the first part of the paper an historical summary is given regarding the occurrence of the disease and the various causes that have been assigned to it. In the second part he describes experiments which included a thorough microscopical examination of many diseased specimens, with the result that no animal, fungus, or bacterium could be isolated that could be shown to be the cause of the trouble. It is believed by the author to be a typical pathological disturbance due to a continued storing of reserve materials, but the inducing factors are as yet unknown.

The heart and dry rots of sugar beets, W. KRÜGER and G. WIMMER (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 640, II, pp. 379–385*).—By means of sand cultures a study was made of the causes contributing to the heart and dry rots of beets.

The authors state that these diseases have been attributed to a number of causes, among them too rapid growth during the young stages of the plant, too great an amount of soil moisture, especially when following a dry season, and attacks of the fungus *Phoma betæ*. The characteristics of the two forms of disease are said to be quite distinct, although they are closely associated. The

heart rot attacks the central leaves and works down into the crown of the root, while the dry rot appears on the sides of the root, usually on those portions not furnished with rootlets.

The use of certain fertilizers is said to favor the development of the disease, nitrate of soda being particularly detrimental in this respect. A moist soil also favors the disease through the production of an active growth.

The internal disease of the potato, A. S. HORNE (*Ann. Mycol., 7 (1909), No. 3, pp. 286–288*).—A preliminary note is given of a disease of potatoes variously known in parts of England as "bruise" and "internal disease." Tubers affected with this disease show no external characteristic symptoms. The flesh remains firm, but is marked to a greater or less degree with dark brown specks, blotches, or streaks, rendering the tubers useless.

A study of the trouble showed that it was due to an organism which exists within the cells of the host. The organism, which is provisionally regarded as a Chytridiaceous fungus, begins growth as a small vesicle within the cell, being attached to the cell wall by a fine thread. These vesicles increase in size and in the storage cells become wedged among the contents. The vegetative body gives rise to one or more spheres, which vary in appearance according to the degree of development.

The composition of potatoes attacked by Phytophthora, G. RIVIÈRE and G. BAILHACHE (*Jour. Soc. Nat. Hort. France, 4. ser., 10 (1909), June, pp. 349, 350*).—According to the authors the glucose in potatoes attacked by *P. infestans* amounts to 8.5 parts in 1,000 of the pulp as compared with 4 parts in 1,000 for the sound potatoes. It is believed that this difference is due to the action of diastases secreted by the mycelium of the fungus, which causes a saccharification of a certain amount of the starch.

A new anthracnose of figs, F. L. STEVENS and J. G. HALL (*Ztschr. Pflanzenkrank., 19 (1909), No. 2, pp. 65–68, pl. 1*).—The authors describe a disease of figs that is said to occur in eastern North Carolina. The fruits and leaves are attacked and a rot of the fruit is caused which in general resembles the bitter or ripe rot of the apple. The cause of the trouble was found to be a species of Colletotrichum, to which the name *C. carica* n. sp. is given.

Inoculation experiments with cultures of the organism showed that the characteristic spotting of the fruit could be produced in a few days in a moist atmosphere, and the climatic conditions of eastern North Carolina are said to be such as to favor the growth of the fungus.

A leaf disease of the olive, L. PETRI (*Atti. R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), I, No. 11, pp. 620–623, figs. 2*).—In April, 1909, there was reported from several regions in Italy a destructive leaf disease of the olive, in which portions of the leaves were discolored and the tissues of the leaf dead. A study of the material showed that the trouble was due to the fungus *Phyllosticta insulata*. The gross characters of the disease resemble in a marked degree those caused by *Coniothyrium oleæ* and *Stictis panizzei*, both of which have been reported upon olive leaves. The author thinks it probable that these diseases have been confused and that *P. insulata* is the cause of much of the injury hitherto attributed to the others. An amended description of the species is given.

The fungi of yerba mate, C. SPEGAZZINI (*An. Mus. Nac. Buenos Aires, 3. ser., 10 (1909), pp. 111–141, figs. 8*).—Descriptions are given of fungi occurring on the Paraguay tea (*Ilex paraguayensis*), 72 species being technically described, a number of which are new. In a preliminary statement regarding these parasites notes are given on a few of the more common and destructive forms.

American gooseberry mildew (*Jour. Bd. Agr. [London], 16 (1909), No. 2, pp. 117–125*).—An account is presented of gooseberry mildew (*Sphærotheca*

mors-uvæ), the different stages in its life history being described. Suggestions are given for the control of the disease, which include the pruning and destruction of all infected shoots and thorough spraying. It is said that young vigorous shoots, such as are produced naturally by certain varieties or by other varieties where cultivation and fertilization are used, are the most subject to attack.

The mildew of gooseberries, G. FRON (*Ann. Inst. Nat Agron., 2. ser., 8 (1909), No. 1, pp. 131–138, figs. 6*).—The author describes the mildew of gooseberries due to *Sphærotheca mors-uvæ*, which he says is specially destructive to *Ribes rubrum*, *R. grossularia*, and *R. nigrum*, the fruits, leaves, and young shoots being subject to attack. The characteristics of the disease caused by this fungus are contrasted with those of the mildew (*Microsphæra grossulariæ*) which is said seldom to attack the fruit. The introduction and spread of the disease throughout Europe is described and special attention called to it in order that means may be taken to prevent its introduction into France if possible.

Diseases of deciduous forest trees, H. VON SCHRENK and P. SPAULDING (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 149, pp. 85, pls. 10, figs. 11*).—This bulletin gives the results of several years' investigations on some of the more important diseases of deciduous trees. After a brief introduction, the diseases due to environmental causes such as smoke and sulphur gases, unfavorable soil conditions, extreme cold, wind, etc., are described. The authors then discuss diseases caused by insects, the higher plants, and miscellaneous fungi, among those described being mildews, tar-spot of maple, various rusts, sycamore leaf blight, leaf spots, leaf blisters, chestnut bark disease, root rots, etc.

The most attention in the bulletin is given to diseases due to wound fungi, those described being the white heart rot caused by *Fomes igniarius*, the red heart rot caused by *Polyporus sulphureus*, piped rot of oak and chestnut, soft rot of oaks caused by *P. obtusus*, heart rot due to *F. nigricans*, a white rot of oaks due to *Hydnum erinaceus*, a disease of black locust caused by *F. rimosus*, white heart rot of ash due to *F. fraxinophilus*, red heart rot of birch caused by *F. fulvus*, soft heart rot of catalpa caused by *Polystictus versicolor*, the heart rot of oaks due to *F. everhartii*, a white rot caused by *Polyporus squamosus*, and several forms of sap rots due to different fungi.

A chapter is devoted to the decay of structural timbers, in which the causes and factors favoring the decay and manner of infection are described, and the susceptibility to decay of different kinds of timber is shown, after which preventive methods are briefly described.

A bibliography is appended.

The catalpa leaf spot, J. B. PARKER (*Ohio Nat., 9 (1909), No. 7, pp. 509–512, pl. 1*).—The author collected in October, 1908, from a catalpa tree on the campus of the Ohio State University, leaves that were affected by a leaf spot disease, which was very prevalent upon the tree. A study of the material showed the presence of a number of fungi. Herbarium material from several sources was examined and similar species were obtained. Among the fungi present were noted *Macrosporium catalpæ*, *Phyllosticta catalpæ*, a species of Epicoccum, and one of Cladosporium, all of which are considered as probably saprophytic and to have no part in producing the spots upon the leaves.

As a result of the author's study he is of the opinion that the fungus causing the leaf spot is a new species belonging to the genus Didymosphæria, to which he has given the name *D. catalpæ* n. sp. This is believed to be the perfect form of *P. catalpæ*. The relationship of the other fungi to the leaf spot remains to be proved.

Observations on the oak mildew in 1908, NOFFRAY (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 3, pp. 226–232*).—Observations are reported on the oak mildew, which made its appearance in 1907 and became quite destructive in 1908.

The author concludes that the oïdium stage present is not the summer form of *Phyllactinia suffulta*, as has been claimed. His observations were made largely on the development and spread of the disease, and he states that in general it is worse on coppice 3 years old or less, and that it rarely occurs on trees in coppice that have attained 7 or 8 years. Apparently most of the indigenous species of oaks are subject to attack, as well as the American species when grown as coppice, but when grown isolated the American species seem to be free from this pest.

The fungus injures the trees by checking the normal development, inducing a great multiplication of branchlets during the summer, and through the destruction of the leaves, preventing the lignification of the extremities of the branches.

A new fungus on swamp cedar, H. J. BANKER (*Bul. Torrey Bot. Club, 36 (1909), No. 6, pp. 341–343, pl. 1*).—A description is given of *Steccherium ballouii* n. sp., which has been found growing on the swamp cedar, proving quite destructive. So far as present information goes, the fungus seems to be confined to this one host plant, and it is likely to escape notice, as the sporophores are borne high on the tree close to or in the canopy, and from their position, size, and coloring, and tendency to fall away from the deadened wood, they are not readily detected. This species and one other (*Echinodontium tinctorium*) of the family Hydnaceæ are the only ones known to be strictly parasitic.

Carnation alternariose, F. L. STEVENS and J. G. HALL (*Bot. Gaz., 47 (1909), No. 5, pp. 409–413, figs. 8*).—The authors' attention was called to a disease of cultivated carnations, and an examination of infected material showed that the cause had been hitherto undescribed.

The disease manifests itself as spots, mostly upon the leaves, but sometimes upon the stems, especially at the nodes. These spots have an ashy whiteness, the centers of which are more or less occupied by a black fungus growth. The tissues are dried, somewhat shrunken, and thinner than healthy portions of the leaf. When occurring at the nodes the fungus usually involves the bases of both of the leaves, as well as the stem between them, and as the spots increase the stem is penetrated, the tissue is killed, and the death of the distal portion of the plant is caused.

So far the variety Mrs. Thomas W. Lawson appears particularly subject to the disease.

A laboratory study was made of the fungus, and inoculations showed that the disease could be readily transferred. The cause is determined to be *Alternaria dianthi* n. sp., the cultural and other characters of which are described.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The Biota of the San Bernardino Mountains, J. GRINNELL (*Univ. Cal. Pubs., Zool., 5 (1908), No. 1, pp. 1–170, pls. 24; abs. in Science, n. ser., 29 (1909), No. 748, pp. 700, 701*).—This account is based upon collections made from the highest mountain group in southern California by the author and his assistants during the summers of 1905, 1906, and 1907. Four zones are represented in this region. Lists are given of the plants, birds, mammals, and reptiles collected. More particular attention was given to the collection of birds, of which 139 species are re-

corded. Thirty-five species of mammals and 20 species of reptiles were detected. Numerous data are given of the habits of many of the species collected. Vernon Bailey presents in *Science* a review of this work.

Game [in Massachusetts] (*Rpt. Comrs. Fisheries and Game [Mass.], 1907, pp. 51–81, pls. 4*).—The so-called Chinese, ring-necked, or English pheasant (*Phasianus torquatus*), first introduced into Massachusetts in 1895, is now well established as a game bird. An account is given of the occurrence and protection afforded the eastern pinnated grouse or heath hen (*Tympanuchus cupido*), of which to-day the very last stand is on the island of Martha's Vineyard. Breeding experiments with ruffled grouse and quail, under the direction of A. Merrill, are considered at some length. During the year under report there was a scarcity of gray squirrels in certain sections of the State. Deer were the source of considerable injury to crops.

The otter in eastern Massachusetts, W. Brewster (*Science, n. ser., 29 (1909), No. 744, pp. 551–555*).—A further discussion of the occurrence of the otter in Massachusetts (E. S. R., 20, p. 952).

Birds of the world, F. H. Knowlton and R. Ridgway (*New York, 1909, pp. XI+873, pls. 16, figs. 236*).—This is a work intended to supply the demand for popular information. Following several preliminary chapters on the general appearance and structure of birds, their migration, distribution, classification, etc., every family is said to have been passed in review and accorded approximately equal and even treatment.

On bird protection and bird destruction in New South Wales, A. J. North (*Agr. Gaz. N. S. Wales, 20 (1909), No. 2, pp. 141–147*).—A brief consideration of this subject by the ornithologist to the Australian Museum at Sydney.

Report of the superintendent of entomology and inspector, A. Craw (*Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 4 (1907), pp. 79–97, pl. 1*).—This report covers the work for the year ending December 31, 1907.

During this period 101,923 packages of fruit and vegetables discharged by vessels arriving at Honolulu from outside the Territory were inspected, and 690 packages found infested with injurious insects or plant diseases. There were also inspected 228 packages of plants and seeds received through the mails.

Insects and other pests found upon importations included the potato moth (*Lita solanella*) upon potatoes from Sydney, the potato scab upon potatoes from San Francisco, a small brown beetle upon garlic, the San José scale on apples from San Francisco, a fungus disease on sugar cane from the Orient, coleopterous larvæ on lupine seed from Italy, and mites on rubber seed from Ceylon. Brief notes on the local inspection work are also included.

An account of the introduction, breeding, and distribution of beneficial insects by J. Kotinsky, and one on insect investigations in Mexico by A. Koebele, the latter of which has been previously noted from another source (E. S. R., 20, p. 1146), are appended to the report. The introductions of beneficial insects include a parasite of the orange aphis from California, and ladybirds (*Hyperaspis 8-notata*) from Mexico intended to feed on the avocado mealy bugs (*Pseudococcus nipæ*). The Arizona dung fly parasite appears to be gaining foothold on the islands. It is said to be doubtful whether it is a specific parasite on the horn fly, all evidence thus far being against such a supposition. The siphanta or torpedo bug parasite (*Aphanomerus pusillus*), introduced from Australia, is said to have been established upon the island of Hilo. The colonies of beneficial insects distributed during 1907 are reported in tabular form.

Review of the dragon flies of Wisconsin, R. A. Muttkowski (*Bul. Wis. Nat. Hist. Soc. [n. ser.], 6 (1908), No. 1–2, pp. 57–123, pls. 2, fig. 1, map 1*).—In this

review the author presents tables for the separation of the families, genera, and species of the Odonata here described as occurring in Wisconsin.

The life history of the termite, K. ESCHERICH (*Sci. Amer. Sup., 67 (1909), No. 1730, pp. 136–138, figs. 8*).—An account is given of the life history and habits of the white ant. About 350 species are said to have been described. An announcement is made of a forthcoming book upon these insects.

Termes gestroi, W. TOWGOOD (*Agr. Bul. Straits and Fed. Malay States, 8 (1909), No. 3, pp. 97–104*).—The methods employed in exterminating *T. gestroi* are described. The author has arrived at the conclusion that the eradication of the pest in the Malay Peninsula is possible.

First report of the committee of control of the South African central locust bureau, C. FULLER ET AL. (*Rpt. Committee Control So. African Cent. Locust Bur., 1 (1907), pp. 112, pl. 1*).—The history of the bureau, of which this is the first report, is summarized. Following a dispatch addressed by the High Commissioner to the governors of the British South African colonies, a conference was held at Pretoria in August, 1906, at which the several colonies were represented. Resolutions were passed which led to the formation of a central bureau, located at Pretoria and maintained by subscriptions from the several colonies. The governments of German Southwest Africa, and Portuguese East Africa have since become associated with the bureau. It is the duty of the secretary to arrange for the collection, tabulation, and distribution to each of the contributing administrations of all data concerning the movements and biology of the several devastating locusts of South Africa.

A report is presented of the first meeting of the bureau, which was held at Pretoria in 1907. C. W. Howard, honorary secretary, reports upon the work up to June 30, 1907. A review is given of the work of locust destruction conducted within recent years by the various South African administrations (pp. 44–60) in which the red-winged locust (*Cyrtocanthacris septemfasciata*) and the brown locust (*Pachytylus sulcicollis*) are the species dealt with.

Investigations by C. P. Lounsbury have shown that several hatchings from one laying of eggs may take place, each following after a rain. Eggs that had been kept in bulk in dry tins and jars, were at intervals removed to dishes and wet. These hatched when placed in an incubator at a temperature of 90° F. Eggs secured in 1904 were thus hatched in 1907. Locusts as food and as a commercial product and the treatment of locusts with arsenic are also considered.

Turkish locust destruction, J. B. JACKSON (*Daily Cons. and Trade Rpts. [U. S.] 1909, No. 3460, p. 9*).—With a view to preventing a recurrence of the devastation in northern Syria of 1908, a commission appointed by the government has required every rural inhabitant to collect and deliver at least 55 lbs. of locust eggs under penalty of a fine. This has resulted in the collection of 629,882 lbs. of eggs. In addition the surface of certain territories was plowed over to the extent of over 4,000 acres.

Two new species of North American Tingitidæ, O. HEIDEMANN (*Proc. Ent. Soc. Wash., 10 (1908), No. 1–2, pp. 103–108, pl. 1*).—*Acysta perseæ*, which infests the avocado (*Persea* spp.) and camphor trees in Florida and Louisiana, and *Leptobyrsa explanata*, which infests mountain laurel (*Kalmia latifolia*) and *Rhododendron maximum*, are described as new.

Aphididæ of southern California, I, E. O. ESSIG (*Pomona Jour. Ent., 1 (1909), No. 1, pp. 1–10, figs. 7*).—*Lachnus californicus* taken from cultivated pines, *Rhopalosiphum viola* from violets, and *Pemphigus radicicola* from the roots of *Amaranthus retroflexus* and *Solanum douglasii*, are described as new.

Plant louse parasites, I, C. F. BAKER (*Pomona Jour. Ent., 1 (1909), No. 1, pp. 22–25*). A table is presented for the separation of all the genera of Aphidi-

næ. Eight species and one variety belonging to the genera Ephedrus, Praon, Aphidius, and Diaeretus are described as new.

On two new species of parasites of Aleyrodidæ, L. O. Howard (*Proc. Ent. Soc. Wash., 10 (1908), No. 1–2, pp. 63–65, fig. 1*).—*Encarsia variegata* bred from *Aleurodicus perseæ* on lemon leaves at Orlando, Fla., and *Eretmocerus haldemani* from *Aleyrodes coronata* at Berkeley, Cal., are described as new. *Prospalta aurantii* and *Amitus aleurodinis* are also reported to have been reared from *Aleyrodes coronata*.

Notes on coccidæ, I, E. O. Essig (*Pomona Jour. Ent., 1 (1909), No. 1, pp. 11–14, figs. 3*).—Notes are given on the occurrence in California of the oleander scale (*Aspidiotus hederæ*), yellow scale (*Chrysomphalus citrinus*), black scale (*Saissetia oleæ*), and cottony cushion scale.

The red scale (Chrysomphalus aurantii), A. J. Cook (*Pomona Jour. Ent., 1 (1909), No. 1, pp. 15–21, figs. 5*).—Of the 4 or 5 species of scale insects that are seriously destructive in southern California, the red scale (*C. aurantii*) is considered as most to be dreaded. Its biology, natural enemies, and remedies are briefly considered.

On the cross-breeding of two races of the moth Acidalia virgularia, L. B. Prout and A. Bacot (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 546, pp. 133–150*).—The authors reviewed the results of some earlier rearing experiments and report studies made of the small geometrid moth (*A. virgularia*) in order to obtain further information on the working of Mendel's law of heredity. This moth was found peculiarly adapted to such study, as it will apparently feed upon almost anything belonging to the vegetable kingdom. The southern France form used was obtained at Hyères and the London form at Clampton. Breeding was carried out to the tenth filial generation and 5,531 specimens subjected to careful analysis.

"There is most certainly no Mendelian dominance in coloration in the cross of the dark (London) race of *A. virgularia* with the light (Hyères) race. With remarkable persistence, a first cross of the pure races produced a form of intermediate in coloration."

It is suggested that the failure to find Mendelian inheritance at work was due mainly to the bringing together of two comparatively remote geographical races.

New species of Balaninus, with notes, F. H. Chittenden (*Proc. Ent. Soc. Wash., 10 (1908), No. 1–2, pp. 19–26, figs. 2*).—Five species and one variety here described as new are acompanied by host and locality records.

A new genus and species of Mymaridæ, L. O. Howard (*Proc. Ent. Soc. Wash., 10 (1908), No. 1–2, pp. 68–70, fig. 1*).—The chalcidid *Cosmocomoidea morrilli*, bred from the eggs of a hymenopterous insect at Orlando, Fla., is described as new.

Notes and descriptions of North American parasitic hymenoptera, VI, C. T. Brues (*Bul. Wis. Nat Hist. Soc. [n. ser.], 6 (1908), No. 1–2, pp. 48–56*).—One species each of the genera Anisepyris, Hoploteleia, Oxytorus, Promethes, Zootrephes, Syrphoctonus, Enizemum, and Blacus are here described as new. The specific hosts of these species are not known.

Tetrastichus as a parasite on polygnotus, C. N. Ainslie (*Proc. Ent. Soc. Wash., 10 (1908), No. 1–2, pp. 14–16, figs. 2*).—The author reports the discovery of a species of Tetrastichus which is apparently hyperparasitic upon the insect which plays an important rôle as an enemy of the Hessian fly.

Notes on Toxoptera graminum and parthenogenesis of one of its parasites, W. J. Phillips (*Proc. Ent. Soc. Wash., 10 (1908), No. 1–2, pp. 11–13*).—The author finds that there is apparently no fixed period for the different molts or the appearance of the first young of the spring grain aphis. A temperature

of 8° F. does not kill the insects, and as soon as the temperature rises to from 40 to 50° they go on reproducing. *Lysiphlebus tritici* was found to reproduce parthenogenetically.

The insect pests of clover and alfalfa, J. W. FOLSOM (*Illinois Sta. Bul. 134, pp. 113–197, pls. 2, figs. 35*).—This is an account of the most injurious of the clover insects and of some of the less important species, based upon investigations extending over a period of 3 summers.

In addition to bumblebees the author considers the longer-tongued honeybees (those of the Italian races) to play an important part in the fertilization of red clover. Three insects, the seed midge, the seed chalcid, and the seed caterpillar must be guarded against if a good crop of seed is desired.

The clover-seed midge (*Dasyneura* [*Cecidomyia*] *leguminicola*) prevents the formation of seed. At the time of blossoming the florets affected by this insect remain for the most part green and undeveloped, and their ovaries are hollowed out and empty, or else contain each a small orange, pink, or whitish maggot. Having entered the flower bud the maggot consumes the fluid contents of the ovary before the bud has a chance to open. The eggs are always laid in green flower heads. The chief food plant of the species is red clover, but white clover is also affected. The most effective and most practicable preventive is to cut the first crop of clover as early as possible in order to secure a good seed crop at the expense of a slight reduction in the hay crop.

The clover-seed chalcid (*Bruchophagus funebris*), formerly supposed to be a parasite of the seed midge, eats out the clover seeds and reduces the seed crop materially. Red clover is its chief food, though crimson clover is badly affected. Alfalfa is another food plant, but of minor importance. The insect passes the winter inside the seed on the ground chiefly as a larva. "To summarize: The May and June adults lay their eggs in the first growth of second-year red clover, and most of the adults derived from these eggs appear in July and August, but some of them do not issue until the following May or June. The July and August adults lay their eggs in the second growth, and some of the adults from these appear during the same season; the rest not until the following year. The later the eggs are laid the larger the proportion of individuals to lie over until the next year. The adults have two times of greatest abundance, falling near June 12 and August 12, respectively. This does not mean only two generations, however, but, instead, two lots of individuals." Early cutting in June will hasten the maturity of the seed crop in a way to prevent most of the midsummer oviposition. Volunteer clover should be destroyed.

The clover-seed caterpillar (*Enarmonia* [*Grapholitha*] *interstinctana*) destroys the unopened buds and tender green seeds by eating out a cavity in the head. Red clover is the chief food plant, but white clover is also affected, and the species has been reared from alsike clover. As a remedy for the attack it is recommended that the crop be cut and stored early in June.

The pea or clover louse (*Macrosiphum pisi*), the dominant species of aphid on these plants, is the source of considerable injury. Numerous enemies of the pest are mentioned. Spring pasturing or clipping of the clover will check its multiplication. The clover-leaf weevil (*Phytonomus punctatus*) is ordinarily held in check by a great variety of adverse influences and seldom gets control of the plant. The clover-root borer (*Hylastinus obscurus*) is gradually spreading over the United States and has already ruined crops of clover in several States. The clover-hay worm (*Hypsopygia costalis*) is widely distributed in Illinois and has done no little damage in various parts of the State. If the pest is present in a barn, old refuse clover hay should be removed and burned

before new clover is put in. The clover-leaf midge (*Dasyneura trifolii*), which feeds on white clover, is of small economic importance. The clover callipterus (*Callipterus trifolii*) is a common aphid in clover fields, but has not become destructive. The clover-stem borer (*Languria mozardi*) has never been a pest. The clover sitones (*Sitones flavescens*) has never been reported as injurious in this country, but needs to be watched. The clover-root mealy bug (*Pseudococcus trifolii*), which occurs near the crown of the plant, must in the future be counted among insects that kill clover.

Under each pest considered the author critically reviews previous work, giving references to the literature. Comprehensive accounts are given of the life history, bionomics, natural enemies, and methods of control.

Cabbage worms and suggestions for destroying them, W. E. Rumsey and F. E. Brooks (*West Virginia Sta. Bul. 120, pp. 345–352, pls. 2*).—In this bulletin the authors give a popular account of these pests. Paris green in the proportion of 1 lb. to 200 gal. of water applied in the form of a mist spray is considered the most efficient remedy.

The cigar case-bearer (Coleophora fletcherella), A. G. Hammar (*U. S. Dept. Agr., Bur. Ent. Bul. 80, pt. 2, pp. 33–44, pls. 2, figs. 4*).—The history of this pest is first reviewed. It is evidently a native insect which fed originally on crab apples and hawthorne. The attention of entomologists was first drawn to its injury in 1888, when it was observed at Rochester, N. Y., feeding upon the young fruit of pears. With the extensive planting of orchards it has found in the apple and pear favorite food plants and it is largely to these two fruits that its depredations have been confined, although it has also been recorded feeding upon quince and plum. It has been reported from Ontario, Quebec, Nova Scotia, Prince Edward Island, and British Columbia in Canada, and from the States of New York, Kansas, New Mexico, Pennsylvania, and Michigan. Technical descriptions are given of the different stages.

In the early spring the minute larvæ free their cases from the branches where they have overwintered and search for food. About the middle of June the larvæ cease feeding and migrate from the leaves to the branches. The anterior end of the case is firmly fastened to the branch by means of silk, and a mass of silk is placed in the same end for the attachment of the cremaster of the future pupa. A day or two after fastening the case pupation takes place and from 10 to 12 days later the adult emerges. At North East, Pa., the first adult emerged June 22. The maximum emergence took place during the early part of July, while after July 25 no adults emerged.

The eggs are generally laid along the midrib on the underside of the leaves, where they are found inserted in the pubescence or down of the leaves. The egg period lasts from 15 to 16 days. During their early life the larvæ are true miners and feed for about 2 weeks on the inner tissues of the leaves. Toward the beginning of August the larvæ construct a minute case on the upper and lower skins of the mined area of the leaf.

Microdus laticinctus has been reported to be a parasite of the pest. *Habrocytus* sp. was bred in considerable numbers at North East, Pa., and a small yellow mite was found to destroy the egg. Larvæ of *Chrysopa oculata* and ladybird beetles vigorously attacked the eggs and larvæ.

It has been demonstrated that the insect can be held under control either by a kerosene emulsion or a Paris green spray applied in the early spring, before and while the leaf buds are opening. In orchards regularly treated with arsenical sprays for the codling moth, the cigar case-bearer if present will undoubtedly be kept in check.

A complete bibliography is appended.

The codling moth in the Ozarks, E. L. JENNE (*U. S. Dept. Agr., Bur. Ent. Bul. 80, pt. 1, pp. 32, figs. 8*).—This is a detailed account of biological studies conducted by the author at Siloam Springs, Ark., largely during 1908.

Three generations of larvæ are said to occur in the Ozarks of northern Arkansas, and most of the members of the second generation develop into adults. Wintering larvæ began to pupate late in February or early in March, and the last individual on May 20, but 70 per cent of the larvæ had pupated by April 21. The first moth was observed on March 31, about the date of the full bloom of apple trees, and the majority of the spring pupæ had given out adults by May 27. The last adult observed did not emerge till June 8. The spring pupal period out of doors ranged from 31 days for a larva which pupated April 2 to 8 days for several individuals which pupated between May 8 and 13.

Records of 28 spring brood moths emerging from April 13 to 23 and confined in a Riley rearing cage out of doors showed an average life of 10.5 days. Another lot of 35 moths that emerged April 25 to May 4 gave an average life of 9.1 days. The moths were able to deposit fertile eggs in 3 to 5 days after emergence. Eggs collected in the field began to hatch April 27, indicating that oviposition had commenced as early as April 7, at the time when apple blossoms had nearly all fallen. The last unhatched eggs in the first brood were found May 27, while in 1907 the last were obtained June 2. Of 67 eggs collected in an orchard April 27, 53 occurred on the upperside of the leaves, 13 on the back of the leaves, and 1 on a twig. Some of the eggs were a considerable distance from any fruit, but as a rule the moths seemed to have selected the fruit cluster. The first eggs contained in cages were deposited the night of April 19. These were subjected to very cool weather, including frost, and gave a maximum period of 21 days, or an average of 19.6 days. Eggs deposited May 8 hatched in 8½ days, and a lot laid May 10 hatched in 7½ days. The minimum period recorded was 5 days. It is considered that the date of the earliest hatching of larvæ can be put fairly accurately at about April 27 or 3 weeks after the petals had fallen.

The first cocoon was found May 27. Larvæ placed on bagged fruit May 4 reached maturity and left the fruit May 26 to 29, after an average life in the apple of 23.8 days, the minimum being 22 and the maximum 25 days. The period from the leaving of the fruit to pupation varied from 3 to 19 days. The first brood of larvæ began to pupate May 27, just a week after the last stragglers of the wintering larvæ under observation had pupated. Of 42 first-brood pupæ observed the average duration of the stage was 10.7 days, ranging from 9 to 13 days. The total period from the time the larvæ left the fruit until the adult issued averaged 17.8 days, with a range from 13 to 21 days. The earliest first-brood moth emerged June 8, on which date the last belated moth of the spring brood also issued. Sixteen of the earliest moths caged June 8 to 15 showed an average life of 6.2 days. Oviposition began 5 days after the first moth was caged. The interval between the emergence of the first adult of the wintering brood and the earliest first-brood moth was 69 days.

The earliest of the first brood of moths began depositing eggs on the night of June 13. All eggs of this brood required a nearly uniform period of 5 days for incubation. The band record indicated that the second-brood larvæ began to leave the fruit by July 15. Larvæ transferred to bagged fruit June 25 reached maturity and left the fruit in from 21 to 31 days, the average being 24.6 days. The period in the fruit kept in the laboratory in 1907 was from 15 to 22 days, with an average of 18.1 days. Of 75 larvæ maturing from July 12 to September

1, the time between leaving the fruit and pupation, in vials out of doors varied from 3 to 21 days, with an average of 11.86 days.

Of 78 second-brood pupæ, from larvæ maturing after July 12 and until September 1, the longest pupating stage was 17 days, the shortest 8 days, with an average of 10.5 days. Moths of a second brood were obtained July 25 from reared material. The last moth to emerge out of doors appeared October 1. Oviposition in a cage began on August 5 by moths the first of which emerged July 30. The interval between the emergence of the earliest first-brood moth on June 8 and the earliest of the second-brood on July 25 gives a period of 47 days for the life cycle.

In cages third-brood eggs were first secured August 5. All second-brood and third-brood eggs laid before August 28 hatched in 5 days. In cages the first hatching with third-brood larvæ was on August 14, from which time they continued to hatch in numbers up to September 20, the last hatching on October 15. Forty-one third-brood larvæ hatching August 14 and reared in picked fruit in jars out of doors required from 19 to 32 days to become full grown, the average being slightly over 24 days. After September 1 all larvæ appearing under bands were of the wintering brood.

Several adults were bred from larvæ in peaches.

Records show that not more than one larva is likely to reach maturity in a single fruit at the same time. The normal number of molts is apparently 6, though 3 of 12 larvæ carried to maturity molted 7 times.

A mite (*Trombidium* sp.) which destroys eggs and young larvæ was found to be fairly common on apple and other trees. *Solenopsis validiusculus* and *Cremastogaster bicolor* were frequently found attacking live larvæ under bands, and *Pimpla annulipes* was frequently reared from band-collected material. Two specimens of a small tachina fly (*Tachinophyto* sp.) were reared in 1907.

It is said that a smaller percentage of fruit is infested by the codling moth in the locality where the investigations were conducted than in many places where only 2 generations are developed. In 1907, counts from 8 unsprayed trees (4 Ben Davis and 4 Winesap) showed a percentage of wormy fruit varying from 48.1 to 64.1, the average on the Winesaps being 50.7 and on the Ben Davis 60.4.

A summary of the seasonal history of the insect for 1908 as detailed is shown diagrammatically.

Life history of the codling moth in Virginia, J. E. Buck (*Virginia Sta. Rpt. 1908, pp. 54–89, figs. 22, dgm. 1*).—This contains both life history studies and records of spraying operations for the year, being a more detailed account than that previously noted (E. S. R., 21, p. 158), particularly as relating to the life history and bionomics of the pest.

It is stated that data collected during the summer of 1908 show that from 20 to 70 per cent, or an average of 43 per cent, of the entire apple crop of Virginia was affected by codling-moth larvæ and that 75 per cent of these affected apples, on some varieties, fall before picking time. Counts of over 400 cocoons observed on apple trees revealed the fact that birds had destroyed fully 85 per cent of the worms.

The first pupa observed in the locality of Blacksburg was on March 28, and observations in the field showed that all larvæ had pupated by April 28. It appears that the earlier pupæ of the wintering larvæ remain about 1 month in the pupal stage before the moths emerge. The first moth from cocoons taken in the vicinity appeared on April 26. Eggs from the first moths to emerge were obtained May 25.

The first larvæ entering apples were found June 2. Counts of 1,000 apples showed that 71 per cent of the larvæ of the spring brood entered the apples at

the calyx cavity, 8 per cent at the stem, and 21 per cent at the side. The larvæ stay in the apples from 20 to 30 days.

The emergence of the moths of the second brood at Blacksburg was from July 4 to August 28. The incubation period of the eggs in July was 7 days, during which period the average daily temperature was 69.8°. It is concluded that fully 60 per cent of the second brood of larvæ enter the side of the apple.

A small ant (*Solenopsis tenuis*) was found to be very active in destroying the larvæ.

Apple enemies and how to fight them, W. M. Munson (*West Virginia Sta. Bul. 121, pp. 357–366*).—A brief account of the insect pests and fungus diseases of the apple, with formulas for spraying mixtures and directions for their application.

Combating the Eudemis, J. Feytaud (*Rev. Vit., 31 (1909), Nos. 789, pp. 92–97; 790, pp. 124–129; 791, pp. 149–151; 792, pp. 184–188; 793, pp. 208–210*).—During 1908 *Eudemis botrana* is said to have been the source of great injury to grapes in the Gironde and neighboring departments. The author here reports experiments made during the year with liquid insecticides.

The grape-cane gall maker and the grape-cane girdler, F. E. Brooks (*West Virginia Sta. Bul. 119, pp. 321–339, pls. 5*).—The grape-cane gall maker (*Ampeloglypter sesostris*) which has previously been reported to be the source of injury in Ohio (E. S. R., 12, p. 662) is here reported to be the source of similar injury to vines in West Virginia. The beetles begin to appear on the vines in May and are present for several weeks. The eggs are deposited in the young canes just above the joints and beyond the last or outer bunch of fruit. The swelling of the cane at the point of injury commences soon after the wound is made, but the gall does not reach full size until 6 or 8 weeks later. The presence of the galls appears to have but little effect on the growth and vigor of the cane, although occasionally one will be broken off by the wind or the weight of the leaves. Observations made of the process of oviposition are described. It is estimated that ordinarily but 2 eggs are deposited in a day and that but 25 to 40 eggs are deposited by an individual. The eggs hatch in from 7 to 10 days. The larvæ feed first in the mutilated wood about the egg chamber and later work their way along the heart of the cane either above or below the gall. A high percentage of the larvæ were found to be parasitized. Out of 45 galls examined July 10, 24 contained larvæ or pupæ of parasites which had killed the gall maker. The more common parasite was determined to be a species of Eurytoma.

The grape-cane girdler (*A. ater*), which in the past has confined its attack chiefly to the Virginia creeper, has attracted attention in West Virginia as an enemy of the grape. The beetles appear on the vine in the spring just before the blossoming season. The eggs were first found by the author on May 13 and the last on June 10. The wound which the beetle makes in ovipositing causes the tip and terminal leaves on the young cane to drop over and die and shortly afterward to fall from the vine. The egg is not carried to the ground with the prunings when they fall, but remains in the vine, and the larva which develops therefrom feeds in the heart of the stump from which the leaves and tip were removed. The incubation period for eggs deposited on May 19 was 10 days. The larva feeds in the heart of the cane, eating out a burrow that extends only between the two joints on either side of the place where the egg is laid. The length of the larval stage is about 34 days. The cane in which the larva feeds dies back to the first joint below the egg chamber and drops from the vine about 6 or 8 weeks after the eggs are deposited. The larva changes to a pupa soon after the dead section of the cane drops. When the larva is ready

to pupate it packs its burrow in two places with pellets of fiber scraped from the surrounding cane. The pupa changes to the adult insect in about 2 weeks. *Tyroglyphus cocciphilus* is said to enter the egg chambers of the beetle when they are opened and destroys the eggs. Two species of hymenopterous parasites, one a Macrodyctium, were found attacking the larvæ.

Very little preference appears to be shown by either of these two pests for any particular species or variety of grape. The same remedies apply to both pests, and consist of cutting off the injured canes below the wounds in July and burning them together with all litter accumulated beneath the vines. Spraying in May and June with arsenical poisons, as is required for holding other pests in check, will destroy the imagos.

A new Tetranychus, N. BANKS (*Proc. Ent. Soc. Wash., 10 (1908), Nos. 1–2, p. 36*).—*Tetranychus opuntiæ*, a species collected from the prickly pear cactus in Texas and here described as new, is said to be very injurious to that plant.

Combating the coconut palm scale (Aspidiotus destructor), M. SCHWARTZ (*Tropenpflanzer, 13 (1909), No. 3, pp. 114–129*).—The author considers the life history and habits of this pest at length. The value of natural enemies is also considered and remedies are discussed. References are given to literature on the subject.

The leopard moth (Zeuzera pyrina), L. O. HOWARD and F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Circ. 109, pp. 8, figs. 2*).—This pest, a native of Europe, and first reported in the United States in 1879, has now become a source of injury to many kinds of shade and ornamental trees in New York, New Jersey, and some of the New England States. Orchards also are often injured.

The larvæ do not feed upon the foliage, but bore in the trunks and branches. The work has the effect of girdling, the injured portions being blown down by heavy windstorms, while in the case of severe attack the growth of the tree is checked, frequently causing its death. The eggs are deposited in the soft tissues of the young growth. The larvæ hatch out in about 10 days, and penetrate the wood, where they remain for nearly 2 years before pupating within the burrow.

No specific natural enemies of the pest have been recorded in this country. The most efficacious remedial measure consists in cutting off and destroying the affected branches, and in the injection of bisulphid of carbon into the holes or burrows where the larvæ are at work.

The green-striped maple worm (Anisota rubicunda), L. O. HOWARD and F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Circ. 110, pp. 7, figs. 3*).—This species attacks maples of all kinds, including the sugar maple, and is especially partial to silver and swamp maples. It also feeds occasionally on boxelder, and will defoliate oak in the absence of its favorite food trees. The pest is a native of North America, more abundant in the West than in the East. The winter is passed in the pupal stage. The moths issue in May or June, and soon commence depositing their eggs on the underside of the leaves. The larvæ hatch out in 8 or 10 days. Four molts are passed in about a month, when they pupate, and about 2 weeks later the moths emerge. In the District of Columbia there are 3 generations a year. An Ichneumon fly (*Limneriam fugitivum*), and the tachinids, *Frontina frenchii* and *Belvosia bifasciata*, are parasites of this insect. Arsenicals, trenching, and hand picking are described as remedies.

Injury to oak forests in Texas by Heterocampa manteo, W. A. HOOKER (*Proc. Ent. Soc. Wash., 10 (1908), No. 1–2, pp. 8, 9*).—The variable oak-leaf caterpillar (*H. manteo*) is reported to have defoliated oaks in Lamar and Red

River counties, Texas, in 1904. *Calosoma scrutator* and *C. calidum* were observed to be important predaceous enemies of the caterpillar.

Some common bagworms and basketworms, C. Fuller (*Natal Agr. Jour., 12 (1909), No. 2, pp. 185–195, pls. 2, figs. 14*).—In this account particular attention is given to the wattle bagworm, which has assumed considerable importance due to the development of the wattle industry in Natal. Biological data from original investigations are reported on this species. Either the application of arsenicals or hand picking is recommended as a remedy.

The Ohio species of the genus Disonycha, L. L. Scott (*Ohio Nat., 9 (1909), No. 3, pp. 423–430, figs. 4*).—This account includes life history notes on *Disonycha quinquevittata*, a species that feeds upon *Salix interior*. A bibliographical list is appended.

A new orchid pest, L. Lindinger (*Jahrb. Hamburg. Wiss. Anst., 25 (1907), Beiheft 3, pp. 121–124, pl. 1*).—An account is given of *Leucodiaspis cockerelli*, which has been found by the author on orchids in a garden at Hamburg.

Crusade against mosquitoes in Leipsic, S. P. Warner (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3468, p. 5*).—On account of the recent occurrence of many cases of malaria in Leipsic, stringent measures have been adopted in order to exterminate the Anopheles. Circulars with information, directions, etc., have been supplied and certain dates have been specified between which houses must be searched and the mosquitoes destroyed. Those who fail to comply with the regulations promptly and thoroughly are subject to a fine of about $7.50.

Mosquitoes destroyed by the nighthawk, A. H. Jennings (*Proc. Ent. Soc. Wash., 10 (1908), No. 1–2, pp. 61, 62*).—The Cuban nighthawk, warblers, and other birds are reported to have been observed destroying large numbers of mosquitoes on the island of New Providence, Bahamas.

Larvacides, W. C. Gorgas (*Rpt. Dept. Sanit. Isthmian Canal Com., 1909, Feb., pp. 56–58*).—A brief report is given of the larvacides used in dealing with mosquitoes on the Canal Zone. Difficulties are said to occur in the Tropics that render crude oil less effective than in the temperate zone. A proprietary article known as phinotas oil that has been used is said to have several advantages over crude oil. It is considered desirable that a more effective larvacide be obtained.

Further report on a disease of bees in the Isle of Wight, W. Malden (*Jour. Bd. Agr. [London], 15 (1909), No. 11, pp. 809–825*).—This is a continuation of an investigation previously noted (E. S. R., 19, p. 255).

The characteristic features of the disease are said to be a disinclination to work, some distention of the abdomen, frequently dislocation of the wings, and later inability to fly. These symptoms are unaccompanied by any disease of the brood or combs. Anatomically the majority of diseased bees show great distention of the colon and a fragile condition of the chyle stomach, all the other organs being normal. Healthy bees confined to their hives for a few days very closely resemble diseased bees in regard to the condition of their intestinal canals. Histologically the chyle stomach appears to be the only organ affected, and bacteriologically plague-like bacilli were frequently encountered in it, in some cases apparently within the epithelial cells. As these bacilli were not found either in the brood of diseased hives or in the chyle stomachs of healthy bees, the author is inclined to regard them as the cause of the disease. The disease then must be regarded as an infectious one which primarily affects the chyle stomach.

It is concluded that since remedial measures can not be relied on and as the affected area is at present small, an attempt to eradicate by the destruction of all the diseased stocks would be justifiable.

[Introduction of a South China silkworm into Formosa], C. F. Deichman (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3448, p. 14*).—A silkworm which is common in South China is said to have been introduced into Formosa by the government. The central part of Formosa contains many maple trees on the leaves of which this species thrives. Its silk is said to be very strong.

Tasar silk cocoon rearing at the Chaibassa Tasar Farm in Bengal, F. Smith (*Dept. Agr. Bengal, Quart. Jour., 2 (1909), No. 3, pp. 147–157*).—In order to discover the cause of the recent decline in the tasar silk industry and with a view to fostering it, a farm has been laid out and building erected by the Bengal Department of Agriculture.

The tasar worm (*Antheria mylitta*) is known to thrive best when in the jungle. Instead of renewing the stock from wild seed it was found that rearers kept the old seed cocoons in stock, with the result that deterioration set in. In order to remedy this it is proposed to take wild seed and domesticate it for 1 year, then issue it to raisers. The life history and habits of this species are described and several natural enemies mentioned. The low price now obtaining for tasar silk is considered as perhaps the most important cause of the decline in the tasar industry.

FOODS—HUMAN NUTRITION.

Effect of sugar and temperature on fruit juices, Jenny H. Snow (*Jour. Home Econ., 1 (1909), No. 3, pp. 261–266*).—Investigations regarded as preliminary were undertaken to ascertain the effect of sugar in jelly making, to determine whether it is possible to find a temperature or density at which fruit juices jelly, and to measure the relative sweetness of cane sugar, dextrose, and levulose. The fruits used were apples, plums, and currants.

The density at which a good product may be obtained varied with the different fruits, but seemed to be nearly uniform for each fruit and was not affected by the amount of sugar used. It was on an average 30° Baumé for apples, 29° for plums and 26° for currants.

"This density was obtained at a lower temperature and in less time with the larger amount of sugar. The smaller the amount of sugar used, the longer the period of boiling required and the darker the color of the product.

"In each case the smaller the amount of sugar, the more pronounced the fruit flavor of the jelly. . . .

"It was found that the currants, grapes, and plums would jelly without adding sugar, but the product was neither clear nor palatable and the cost in the case of the currants was over a dollar a glass.

"The jelly containing the smaller proportion of sugar seemed to keep as well as that containing the larger proportion."

Taking cane sugar as the standard, "dextrose [is] much less sweet, . . . levulose, sweeter, . . . [and] mixture of equal parts of levulose and dextrose, less sweet.

One of the experiments consisted in cooking larger amounts of apples with cane sugar added respectively before and after boiling. When the sugar was added to the apples before cooking, and boiled with them, it was found that it was largely inverted; when added at the close of the cooking period, it was only slightly inverted.

"The difference in sweetness between stewed apples when the sugar has been added before and after cooking, respectively, is so slight as to be of little practical consequence. . . .

"The experiments with one exception show that the acidity is less in apples cooked in water either with or without sugar than in uncooked fruit."

Contribution on the chemistry and physics of jelly making, NELLIE E. GOLDTHWAITE (*Jour. Indus. and Engin. Chem., 1 (1909), No. 6, pp. 333–340*).—In the experiments which are reported the effect of adding sugar and organic acids to fruit juices in jelly making was studied, as well as the relation of boiling point and specific gravity, and the possibility of making jelly of good texture from an artificial fruit juice made of tartaric acid, sugar, and pectin isolated from fruits.

According to the author's summary, "the essential constituents of a jelly making fruit juice are, first, pectin; second, acid.

"A desirable accessory constituent is cane sugar. Too much sugar is likely to be used in jelly making with a consequent deterioration of the quality of the jelly. The amount of inversion preferably produced in this cane sugar is yet undetermined.

"Over-dilution of fruit juice should be avoided, since this leads to the use of too much sugar; probably the extra boiling thus rendered necessary also impairs the texture of the jelly.

"The physical constants of hot juice ready to jelly on cooling are, substantially, boiling point 103° C., and specific gravity 1.28.

"Jelly is readily made through boiling pectin with acid, water, and sugar.

"Jelly making seems to consist in so controlling conditions by means of acid and sugar and boiling as to cause the pectin to be precipitated in a continuous mass throughout the volume allotted to it."

As regards the production of artificial jelly, the author states that jelly of excellent quality was easily prepared from a 1 per cent solution of pectin (isolated from fruit juices by means of alcohol) and 0.5 per cent solution of tartaric acid, adding to the mixture, heated to boiling, $\frac{3}{4}$ volume of sugar, and continuing the boiling until jelly was formed on testing. "The total time of boiling did not exceed 15 minutes. Jellies made as above were nearly colorless, but were excellent in texture and taste. When a few cubic centimeters of grape juice were added to the pectin solution the color of the jellies was very pleasing. That these jellies were not made directly from fruit juice would not be suspected from taste or texture. Jellies equally good were made in this way from the pectin from sweet apples, crab apples, and peaches. This last fact would seem to indicate that the pectin of peaches does not differ materially, at least from a practical standpoint, from that of other jelly making fruits.

"It may be of interest to add that pectin was extracted from jelly (the jelly being previously dissolved in an equal volume of water) by the method used for extracting pectin from fruit juices. This pectin apparently corresponded in its physical and chemical characteristics with that extracted directly from fruit juices. Good fruit jelly invariably gives the alcohol test for pectin. These facts would seem to indicate that pectin in the formation of jelly does not undergo any deep seated change, but rather that the phenomenon of jelly making is more nearly physical than chemical."

Discoloration of canned goods, E. W. DUCKWALL (*Canner and Dried Fruit Packer, 28 (1909), No. 21, pp. 29, 30*).—The examination of numerous samples of canned goods led to the conclusion that discoloration is in the majority of cases caused by metallic sulphids, formed by the action of hydrogen sulphid.

"The sources of the hydrogen sulphid may be bacterial action due to insufficient sterilization, production of hydrogen sulphid through decomposition of proteids by action of steam under pressure, as in a heavy process, or by the reaction of sulphids with vegetable acids or with mineral acids which may have accidentally gained entrance to the container. The heavy metals, of course, with which the goods come in contact are the tin and lead of the solder and the tin plate and the zinc from the flux used, though the sulphid of zinc is not

dark colored and would not give the discoloration which would result from the action of hydrogen sulphid on tin, lead, or iron."

The destruction of tubercle bacilli in bread by cooking, B. Auché (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 17, pp. 800–802*).—From experiments in which tubercle bacilli were introduced into loaves up to 2 kg. in weight the author concludes that the bacilli are killed when the bread is baked. He regards it as possible, however, that pathogenic bacteria may survive in the interior of large loaves such as are used in the army.

The composition and analysis of chocolate, N. P. Booth, C. H. Cribb, and P. A. E. Richards (*Analyst, 34 (1909), No. 397, pp. 134–148*).—Chocolate making and similar questions are discussed, and a large number of analyses of coco, chocolate, and other coco products reported. Data regarding the legal requirements for such goods in different countries are summarized.

The composition of cider, B. T. P. Barker and E. Russell (*Analyst, 34 (1909), No. 397, pp. 125–134*).—A number of sorts of cider were analyzed, the experimental data being considered with special reference to the detection of spurious cider. The paper is followed by a discussion.

The composition of kirsch liqueurs and the nature of the cyanogen compounds they contain, X. Rocques and L. Lévy (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 4, pp. 67–69, dgms. 2*).—Determinations were made of the amount of cyanogen compounds present.

Food analyses No. 24, J. T. Willard (*Bul. Kans. Bd. Health, 5 (1909), No. 5, pp. 106–108*).—Data are given regarding the analyses of a number of samples of milk, butter, cream, ice cream, lard, and an egg substitute. The last named was found to consist chiefly of cornstarch and orange coal tar dye. The presence of 0.94 per cent nitrogen indicates that some gelatin was probably present also. "It would be entirely inadmissible to sell such an article as an egg substitute, since it in no way resembles eggs in its chemical nature or nutritive properties."

Ninth annual report on food adulteration under the pure food law, W. M. Allen and H. Hill (*Bul. N. C. Dept. Agr., 29 (1908), No. 12, pp. 80*).—Details are given of the results of examination under the State pure food law of samples of meat, butter, renovated butter and butterine, canned goods, table and cooking oils, preserves and marmalades, confectionery, corn meal and other cereal foods, bottled soda waters and other beverages, baking powder, and similar goods. Of 730 samples examined in 1908, 16.45 per cent were found to be adulterated. In the case of the total 4,301 samples examined since the State pure food law went into effect in 1900, it is stated that the average percentage of adulteration has been 30.58.

Six samples of the table and cooking oils were examined, of which 5 were claimed to be olive oil and 1 cooking oil. In no case were adulterants found.

"Olive oil is the oil obtained from the sound, matured fruit of the cultivated olive tree. It is highly prized as a table oil. Before the agitation of food adulteration became so general, olive oil was much adulterated with other oils, but of late much less adulteration is found in it."

"Cooking oils are usually highly refined cotton-seed oils, and are not much adulterated. Some of the cooking oils are very desirable for such purposes."

[Report of the food and dairy commissioner], A. H. Wheaton (*Ann. Rpt. Food and Dairy Comr. S. Dak., 8 (1908), pp. 189, pls. 3*).—Beside the report of the commissioner on the general work of the year this volume contains the report of the chemist, J. H. Shepard, a list of licensed creameries by counties, a list of licensed butter makers, reports of creameries, and similar material, as well as details regarding the examination under the law of a large number of samples of beverages, butter, oleomargarine, baking powder, spices and condi-

ments, preserves, meats, sugars, canned goods, stock foods, and other materials. Of 188 samples examined 99 were found to be legal and 83 illegal, and 6 were passed.

Annual report of the chemical inspection station at the Hygienic Institute of Halle University, M. KLOSTERMANN (*Hyg. Rundschau, 19 (1909), No. 11, pp. 635–662*).—Data are given regarding the examination of meat and meat goods, milk and milk products, bread and baker's goods, spices, vinegar, honey, tea, and coffee, and concerning utensils, etc.

Circular letters issued by order of the State board of health, H. E. BARNARD (*Mo. Bul. Ind. Bd. Health, 11 (1909), No. 3, pp. 37–39*).—Bleached flour, alum in pickles, sidewalk display of foodstuffs, unprotected foodstuffs, and sausage and meat products are the subjects which are discussed with respect to Indiana legislative enactments.

Official inspections (*Maine Sta. Off. Insps. 7, pp. 8; 8, pp. 9–16; 11, pp. 61–72*).—The subjects included are food and drug standards, regulations gov erning the sale of carbonated beverages for 1909, labeling goods sold from opened packages, data regarding bleached flour, benzoate of soda, sulphur dioxid, ice cream and ice cream substitutes, and reports of the examination of a number of samples of flavoring extracts, soda and cream of tartar, canned sweet corn, maple sugar, prepared flours, spices and pepper, rice, cider vinegar, alcohol, extract of peppermint, and sweet spirits of niter.

A uniform standard for meat inspection, F. MATAROTTI (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 5 (1909), pp. 148–152*).—The author proposes a plan for uniform standards in meat inspection in Pan-American countries.

Inspection of products of animal origin, J. E. RICHELET (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 5 (1909), pp. 237–267*).—The history of meat products, methods of preservation, decomposition, and other similar questions are considered.

The influence of boric acid on diastatic reactions, H. AGULHON (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 20, pp. 1340–1342*).—According to the author's investigations, boric acid has in general only a slight retarding action on diastases, and he believes this offers an explanation of its weak antiseptic properties.

Minimal quantities of food preservatives, J. F. SNELL (*Science, n. ser., 29 (1909), No. 755, pp. 970–972*).—A critical discussion of a graphic method for showing the comparative influence of foods and preservatives in a bulletin of the Bureau of Chemistry previously noted (E. S. R., 18, p. 565).

The standard of living among workingmen's families in New York City, R. C. CHAPIN (*New York, 1909, pp. 372, dgms. 16*).—The object of the investigation reported in this volume was to ascertain the essentials and cost of a normal standard of living in the cities and towns of New York State.

Very complete schedules of inquiry were received from 642 families in New York City, of which 391 were accepted as normal and accurate. The bulk of these represented incomes between $600 and $1,000.

From the large amount of very suggestive data set forth in detail, it is concluded that an income under $800 is not enough to permit the maintenance of a normal standard, while $900 or over probably does permit it, at least so far as the physical man is concerned.

The failure to maintain a normal standard, the author believes, may be due to causes quite outside of the capacity of the individual breadwinner or of the economic forces that determine the rate of wages, two of these outside considerations being the presence of too large families and the inability to make a wise use of the money earned.

The data with reference to food are discussed in an appended report by F. P. Underhill. With reference to the New York studies he states that "comparison between the amounts spent for food by well nourished and poorly nourished families indicates that in general when less than 22 cts. per man per day is spent for food the nourishment derived is insufficient, and when more than 22 cts. per day is expended the family is well nourished."

As to the Buffalo studies "the general conclusion may be drawn that for 21 cts. per man per day sufficient nourishment may be bought in the city of Buffalo to keep a man in bodily health and vigor at moderate muscular work. No definite relation appears to exist between the purchase of a preponderance of animal or vegetable food and an ability to live at a low figure."

The study also includes a copy of the schedule used, a summary of methods used by previous investigators in similar studies of workingmen's budgets, and a partial bibliography.

Cost of living of the working-classes [in the United Kingdom]. A. W. Fox (*London: Govt., 1908, pp. LIII+616, maps 2*).—An extended study was undertaken by the Board of Trade of Great Britain of living conditions in wage-earners' families in the principal industrial towns of the United Kingdom, such topics being taken up as rents, housing, retail prices, and the standard rates of wages prevailing in different occupations. The report includes summaries as well as full data collected in 94 towns. In the form of appendixes information is given regarding the percentage of the population in each town living in overcrowded and other kinds of tenements, the wages and weekly time rates of skilled workmen of different trades, and similar topics.

According to the information summarized, 261 families out of a total of 1,944 reported a weekly income under $6.25; 596 an income of over $10; and 416 an income of $7.50 to $8.75. As the income increases the proportionate expenditure for food decreases, two-thirds of the total expense being for food with incomes of less than $7.50 a week, in comparison with 57 per cent with incomes of $10 a week and over.

"The amount spent on bread and flour together does not show much variation in the different ranges of income, except in the case of incomes above $10, where the family income is augmented to a greater extent than in the other groups by the earnings of children and in which the children included are older.

"In the case of incomes below $6.25 the expenditure on bread and flour forms about 21 per cent of the total spent on food; for incomes between $8.75 and $10 the proportion is 15 per cent. The quantity of bread and flour purchased varies from 28½ to 37¾ lbs. per week, the average being 32 lbs.

"The average expenditure on meat and fish of all kinds is . . . $1.595 per week. . . .

"If we turn to other articles of consumption we find that fresh milk accounts for 16 cts. a week in the families with incomes below $6.25, but the expenditure on fresh milk rises rapidly with the income. The average expenditure for all families is 31½ cts. . . .

"Oatmeal is consumed largely by the Scotch working classes, but hardly at all in England, whilst on the other hand foreign and colonial meat, a common article of food in England, is much less used in most parts of Scotland. . . .

"Rice, tapioca, and oatmeal account for an expenditure of from 9 cts. to 14 cts. a week, a considerable portion of this amount being accounted for by the expenditure on oatmeal in Scotland, which amounts on an average to 16½ cts. per week."

Similar statistics are given for other food groups.

Housing conditions and other topics are also discussed at length.

Cost of living in German towns, A. W. Fox (*London: Govt., 1908, pp. LXI+548, map 1*).—Investigations similar to the above were made by the Board of Trade of Great Britain in 33 of the industrial towns of the German Empire relative to working-class rents, housing, retail prices, etc. Detailed reports and appendixes with data regarding wages and hours of labor, weekly rents, housing and lodging house regulations, regulations regarding the inspection and sale of food, and similar topics are included in the report and there is an introduction by H. L. Smith and a summary by the author.

The average weekly income ranged from under $5 to over $10, and in the greatest number of families was from $6.25 to $8.75. The budgets show that the total weekly expenditure on meats of all kinds, including fish, bacon, etc., was from 97 cts. in families with the lowest incomes, to $2.24 in the case of families with incomes above $10 per week. Similar data are given for other foods.

"Between the United Kingdom and Germany the differences in some respects are very marked. The prevalent type of working-class housing in England and Wales, and to a lesser degree in Ireland, is a self-contained two-storied dwelling, possessing generally 4 or 5 rooms and a separate scullery; in Germany the predominant type is a flat of 2 or 3 rooms with appurtenances, in a large tenement house. The German housing system thus approximates more closely to the Scottish type—blocks of flats of 2, 3, or 4 stories—than to the English. English, but not Scotch, rents of working-class dwellings usually include local taxation, which is based on the rentable value of the dwelling; in Germany local taxation is levied on an entirely different basis, and is not included in rent. In regard to food the British workman's meat consists mainly of beef and mutton, whilst pork (even including bacon) is relatively small in amount; the German workman, on the other hand, eats chiefly pork (including sausage) and beef, and only a very little mutton. The pure wheat bread eaten by the working-classes of the United Kingdom is replaced in Germany either by pure rye bread, or more commonly by some mixture of rye and wheat."

Cost of living in French towns, A. W. Fox (*London: Govt., 1909, pp. LIV+430*).—The results are reported of an inquiry similar to the above, as carried on by the Board of Trade of Great Britain relative to the cost of living in the principal industrial towns of France. Besides the general report, the volume includes detailed reports for the different towns, and summaries of data on municipal regulations and legal enactments regarding food and lodging, specimen factory rules, and similar subjects.

"The main subjects of investigations were the principal types of housing for the industrial population, the customary standards of accommodation and the rents commonly paid by working-class tenants; the kinds of food usually consumed by working-class families and the prices most generally paid; and wages and hours of labor in the principal occupations in each town. In order to arrive at some estimate of the standard of living prevalent among the French industrial classes, over 5,600 budgets showing the expenditure on food by working-class families in a normal week, and representative of numerous occupations and of all grades of working-class incomes, were obtained from the various towns and are analyzed in the present volume. . . .

"In regard to food, the meat dietary of the French working-class family shows a much greater variety than that of either the English or German family of the same class; horseflesh appears to be more largely consumed (chiefly for reasons of taste) in France than in Germany, whilst poultry is much more conspicuous in the food bill of the French than of the English

family. The French workman like the English, eats pure wheaten bread; the breads made of rye, or of rye mixed in various proportions with wheat, so popular in Germany, are little known in France. Vegetables play a much more important part in the dietary of the French than of the English working-classes; when allowance is made for the smaller size of families, the consumption of milk is only slightly higher, whilst that of sugar is, on the other hand, decidedly less."

Improved meals of school children in Charlottenburg, SEYDEL (*Arch. Volkswohlfahrt, 2 (1909), No. 4, pp. 227–231*).—The system of supplying meals to needy children in Charlottenburg schools is described. If they are able to do so, the children pay part of the cost of food; otherwise, it is supplied without cost. The children assist in the serving of the meals with the idea of giving the project an educational value.

Studies of protein metabolism, E. ABDERHALDEN (*Ztschr. Physiol. Chem., 59 (1909), No. 2, pp. 177–193*).—The experimental data reported are discussed with reference to the theory that when food nitrogen is broken down in the digestive tract to its constituent radicals, the cleavage products not required are still further broken down and the nitrogen excreted, while the cleavage products required are assimilated. It is regarded as naturally following that urea can not be regarded as standing in direct relation to the food nitrogen assimilated.

The subject is also discussed with reference to fasting.

The influence of lactic ferments in the absorption of protein, H. LABBÉ and G. VITRY (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 17, pp. 765–767*).—On constant diet urinary nitrogen was perceptibly diminished during the period in which lactic-acid bacteria were taken, while ethereal sulphur in the urine was increased. The coefficient of absorption, that is, the ratio of urinary nitrogen to food nitrogen, was diminished and the so-called Amann coefficient, that is, the ratio of ethereal sulphur to urinary nitrogen, was increased.

The uric acid ferments, E. W. ROCKWOOD (*Proc. Iowa Acad. Sci., 15 (1908), pp. 99–103*).—A progress report of experiments undertaken to study the nature of the ferments which it is believed are concerned in the formation of uric acid from nucleins in the liver.

Rice and beri-beri, W. FLETCHER (*Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 9, pp. 127–134, pl. 1*).—From an extended study, carried on in a general hospital for the insane in the Federated Malay States, of the dietetic origin of beri-beri, of which the earlier results have been noted (E. S. R., 19, p. 1164), the author concludes that there is intimate connection between this disease and the eating of certain kinds of rice in quantity.

As is pointed out, the rice used in the Malay States is of three sorts: Home pounded rice, white rice, and Indian rice. The home pounded rice is the sort eaten by Malays in country districts. "The unhusked grain is stored in large bins, and as it is required for food it is taken and pounded and winnowed by the women of the household to remove the husk."

White rice "is the rice which forms the staple article of food for the Chinese miner, for the town Malay, and for all Asiatic inhabitants of the Peninsula except the Malays of rice-growing districts and immigrants from India. Under the heading of white rice are included the rices sold in the shops as Siamese and Rangoon. . . . The grain or paddy from which this white rice is made is taken to the mills, and there it is husked between revolving millstones. Subsequently it is polished by friction between a revolving stone and fine wire gauze, or by other methods which remove the whole of the outer layers of the grain and leave it white, clean, and pleasing to the eye." This class of rice is sometimes termed "uncured."

Indian rice "includes the various kinds of rice eaten by Indians in . . . [the Malay States]." It is sometimes called "cured" rice. The mode of preparation is as follows:

"The unhusked grain or paddy is soaked in water for 12 to 24 hours, or even longer. It is then heated in vessels containing water over a slow fire until the husks burst. The third stage in the preparation consists of spreading out the grain and drying it in the sun; when this has been completed, it should be possible to separate the husk from the seed by light rubbing between the palms of the hands. The rice is then husked by pounding, or is taken to the mills, where the same process is effected by the millstone, but it is not polished by the rapidly revolving stones against the fine wire gauze. . . .

"In the resulting grain especially, as considered from a dietetic as opposed to a cosmetic point of view, there is a great difference between the rice of the second class (the white rice) and the rice of the first and third classes. In the preparation of the white rice the polishing processes which it undergoes remove the outer layer of the grain, the aleurone layer, rich in gluten, and of great dietetic value.

"The evidence of the experiment [at the asylum] is strongly in favor of beri-beri being due to a defect in diet; and, in this case, at any rate, to a defect in the 'uncured' rice, since except for the difference in the kind of rice the diets of the two groups of patients [which were studied] were exactly the same. During the course of the experiment 219 patients were treated on a diet of 'cured' rice and none of them developed beri-beri. On the other hand, 65 cases occurred amongst the 226 patients on 'uncured' rice. . . .

"It also appears that to cause beri-beri the diet must be of a one-sided nature consisting chiefly of rice. When the diet is very varied there is but very little beri-beri.

"Such rice as is eaten by Europeans in the Federated Malay States is of the 'uncured' variety, but the quantity consumed is quite insufficient to cause beri-beri.

"The well-to-do among the eaters of white polished rice suffer from beri-beri occasionally, but not to the same extent as mining coolies in out-of-the-way districts where transport is difficult and the rations consist in the main of dried fish and rice. . . .

"The cause of beri-beri is to be sought for in the diet. It may be taken as proved that the elimination of white 'uncured' rice from their diets prevented the occurrence of beri-beri in the 'cured' rice group of patients at the Kuala Lumpur Lunatic Asylum.

"The result of the experiment tends to show that white polished rice, although of the best quality, is a cause of beri-beri, acting either by some poison which it contains or by a starvation due to some defect in the nutritive value of such rice. The experiment proves that if in a coolie's ordinary diet white polished rice be replaced by the 'cured' rice which is used in the Kuala Lumpur Asylum, beri-beri will not occur. It is reasonable to infer that the adoption of such a measure in all the prisons and asylums of those countries where beri-beri occurs would entirely prevent the occurrence of the disease in such institutions. It is probable that as people learn the dietetic nature of the disease and the danger of a diet which consists in the main of white polished 'uncured' rice, beri-beri will become as rare as scurvy."

Mercurial poisoning of men in a respiration chamber, T. M. Carpenter and F. G. Benedict (*Amer. Jour. Physiol., 24 (1909), No. 2, pp. 187–202*).—During experiments with the respiration calorimeter at Middletown, Conn., several cases of illness were observed which after careful investigation were attributed

to poisoning by a mercury vapor due to the use of mercury valves in connection with the regulation of the ventilating air current.

Preliminary observations on metabolism during fever. T. M. Carpenter and F. G. Benedict (*Amer. Jour. Physiol.*, 24 (1909), No. 2, pp. 203–233).—In the experiments noted above a marked rise in temperature was observed and the authors studied the effect of this condition of fever upon metabolism, the results being compared with those obtained in experiments under normal conditions.

According to the authors' summary, "the most striking feature regarding these experiments is the marked and rapid temperature rise in certain of them. This was in almost every instance accompanied by a marked increase in the respiration rate.

"In general the carbon dioxid excretion was apparently greater during fever than during control periods.

"The oxygen consumption during fever is in practically all cases noticeably greater than during control. . . .

"While the data show a slight tendency for the respiratory quotient to increase during fever, the complications attending the ingestion of food, variations in muscular activity, and errors in oxygen determination do not warrant any sweeping deductions from these data."

The recorded data indicate that in general "there was an increase in the water of vaporization during fever over that during the control period. Since, however, the control experiments showed marked variations when compared with the fever experiments during periods when there was no appreciable fever, it is obvious that here again we can not draw any sweeping deductions regarding this point."

As regards heat elimination, the authors state that "in view of the necessarily tentative nature of all deductions made from these experiments, it has not been deemed advisable to attempt to discuss the influence of fever on the various paths of heat elimination. . . .

"Whatever doubt may exist with regard to the increase of carbon dioxid production, oxygen consumption, water vaporization, and heat elimination, there can be no doubt that during these experiments there was a marked increase in heat production. In practically every instance we find, during the periods when fever was at its highest, a very noticeable increase in the heat production. . . .

"Unfortunately the data do not throw any light upon the heat production during the period when the body temperature remains constant nor during defervescence of the fever. . . . From these few observations we might infer that the heat production after the body temperature had ceased rising was considerably less than during the period of temperature rise, but further experiments on fever will be planned to include observations on this point."

U. S. Government publications as sources of information for students of home economics. C. F. Langworthy (*Jour. Home Econ.*, 1 (1909), No. 4, pp. 337–344).—A summary and discussion of information regarding the publications of this Department and other branches of the Federal Government, which contain data of interest to students of domestic science and domestic art. The object of this paper is to assist students in using Government publications, which are quite generally available in libraries of colleges of agriculture and other educational institutions.

Free or inexpensive pamphlet literature. Miriam Birdseye (*Jour. Home Econ.*, 1 (1909), No. 3, pp. 253–254).—A list is given of free or inexpensive pamphlet literature which the author considers useful in connection with home economics work.

ANIMAL PRODUCTION.

Some recent studies on growth, R. PEARL (*Amer. Nat., 43 (1909), No. 509, pp. 302–316*).—This is a discussion on the application of quantitative methods in studies of growth changes.

The recent work reviewed includes that of Donaldson on rats and man, Kellicott on dogfish, Burnett on breaking strength of bones in pigs (E. S. R., 20, p. 868), and Armsby on meat production (E. S. R., 20, p. 665). Robertson's work on normal rate of growth is also discussed, and it is pointed out that the theoretical curves used by Robertson when fitted to observational data give an uneven and biased distribution of errors, and that similarity of quantitative relations between phenomena can not safely be taken as proof of qualitative identity. The final proof of qualitative identity of phenomena must always in the last analyses be qualitative in its nature.

The capacity of animals to grow under adverse conditions, H. J. WATERS (*Proc. Soc. Prom. Agr. Sci., 29 (1908), pp. 71–96, figs. 5, charts 2*).—Data are reported on changes in body conformation of steers when kept on maintenance and submaintenance rations.

It was found that bones may lengthen and fat be resorbed when the weight remains stationary. An examination of fat cells showed them to be reduced in size. Three steers, 9, 16, and 17 months old, respectively, when kept on a maintenance ration for a year remained practically stationary in weight but increased on an average 5.91 cm. in length of head, 8.75 cm. in height at the withers, and 3.16 cm. in depth of chest. The same steers decreased on an average 4.66 cm. in width of chest. Full-fed steers were found to increase in height more rapidly than those on a maintenance ration. Animals kept on a submaintenance ration increased in height at withers and length of head, but at the same time lost in weight. Chemical analyses showed a decline in percentage of fat and an increase in percentage of water and protein in animals kept on maintenance and on submaintenance rations.

Heredity, variation, and evolution in protozoa, I, H. S. JENNINGS (*Jour. Expt. Zool., 5 (1908), No. 4, pp. 577–632, figs. 22*).—This is a study of the inheritance of new characters and mutilations in Paramecium.

The conclusions reached are that in protozoa as in metazoa the inheritance of acquired characters meets the same difficulty and does not occur more readily in the one group than in the other, although it has been commonly assumed that in protozoa the parent and progeny are practically identical, hence that any new or acquired characters will be inherited. There was one doubtful case, however, in which certain individuals of one race tended to remain united after fission.

The problem of inheritance lies not in the separation of soma and germ but in the process of cell division. Before a new character can be inherited it must be the result of such a modification of the parent cell as will cause a change in the processes of reproduction, and this is equally true of metazoa and protozoa.

Heredity, variation, and evolution in protozoa, II, H. S. JENNINGS (*Proc. Amer. Phil. Soc., 47 (1908), No. 190, pp. 393–543, figs. 7, dgms. 6*).—This paper deals with heredity and variation in size and form in Paramecium, with studies of growth, environmental action, and selection.

The author shows by polygons of variation and by correlation tables that as in higher organisms the Paramecia were made up of numerous races. The individuals of a race varied much among themselves, but these variations were matters of growth and environment and were not inherited. Selection had no effect within a pure line. The size was determined by the line to which the

animals belonged. Selection within a race was without effect in producing a new race. The fundamental constitution of the race appeared to be resistant to all sorts of influences, changing only in rare instances and for unknown causes. Most differences between individuals were temporary and were without significance in inheritance.

Heredity and variation in the simplest organisms, H. S. JENNINGS (*Amer. Nat., 43 (1909), No. 510, pp. 321–337, figs. 5*).—This is a popular presentation of the articles noted above. The work involved a study and measurement of over 10,000 individuals of Paramecium kept under experimental conditions for many generations.

The advantages of unicellular animals for studying these problems is pointed out. The survival of the fittest among many generations may be observed in the course of a few days. "For studying heredity and variation we get a generation a day, and we may keep unlimited numbers of pedigreed stock in a watch glass that can be placed under the microscope."

Mendel's principles of heredity, W. BATESON (*Cambridge, 1909, pp. XIV+396, pls. 9, figs. 14*).—The main part of this book contains a concise account of the discoveries in regard to heredity made by the application of Mendel's method of research. The aim is to present concrete phenomena rather than to discuss their bearing on the facts of biological problems, although a chapter on biological conceptions and one on practical applications of Mendelian principles have been included. Part 2 contains a bibliography of over 300 references, a biographical notice of Mendel, and a translation of his two papers.

The categories of variation, S. J. HOLMES (*Amer. Nat., 43 (1909), No. 509, pp. 257–285*).—This paper discusses the classification of germinal variations recognized by De Vries.

The author does not think these variations distinct, nor that the facts of Mendelian inheritance compel us to adopt a particulate theory of heredity.

"Neither the facts of variability nor those of Mendelian inheritance give any support to the doctrine of pangens, determinants, or other assumed bearers of unit characters. Unit characters, as elements that can enter or depart from the complex of tendencies that make up an organism, probably have no existence. It is evident that variations differ in their stability, but the explanation of this fact may lie in the physiological relations of the variation rather than in some hypothetical representative unit."

The colors of Highland cattle, J. WILSON (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1909), No. 8, pp. 66–76, pl. 1, dgm. 1*).—From a study of a Highland herd book the author arrives at the following conclusions:

"There are four colors forming the basis of present-day Highland colors, namely, black, blackish-brown or donn, red, and light dun. One other color, white, and other 'markings' have been absorbed from time to time; but these have been almost entirely bred out. The reds may be of several shades, but there are not sufficient data to separate them. Black is the dominant of red. Black produces dun hybrids—registered 'dun,' 'dark dun,' etc.—when mated with light dun. Donn or blackish-brown produces brindle hybrids when mated with black, red, and light dun. Red produces yellow hybrids when mated with light dun. . . . These conclusions are not put forward as absolute certainties, but as conclusions for which some further confirmation is not undesirable. It is hoped that breeders of Highlanders, Longhorns, and Jerseys may give closer attention to shades and markings when registering their stock, and so we shall acquire more accurate data."

Does telegony exist? S. F. MORSE (*Country Gent., 74 (1909), No. 2944, p. 640*).—The author discusses the evidence presented from various sources on the alleged influence of a previous sire on the progeny, and draws the conclu-

sion that up to the present time there is no warrant for the belief that such an influence exists.

The forage value of hélianti, J. Fabre and D. Vidal (*Prog. Agr. et Vit., (Ed. l'Est-Centre), 30 (1909), No. 22, pp. 661–668*).—Hélianti, a species of Helianthus known in France as "American salsify," is considered on the whole to have about the same value as a farm crop as Jerusalem artichoke. Analyses are given of the green forage when cut at different stages. When cut on September 15 for leaves and stalk it had the following composition: Dry matter 34.96, protein 2.272, fat 0.943, nitrogen-free extract 20.42, fiber 8.448, ash 2.877 per cent. The composition of the tubers was: Dry matter 29.25, protein 0.951, fat 0.33, nitrogen-free extract 24.915, fiber 1.267, ash 1.787 per cent.

On the value of dried beet pulp for feeding milch cows, horses, and swine, N. Hansson (*Centralanst. Jordbruksförsök Flygbl. 12, 1909, pp. 3*).—One kilogram of dry matter in roots was found to possess a feeding value for dairy cows similar to that of 0.87 to 0.90 kg. of dry matter in beet pulp. As a part ration for horses dried beet pulp was found to equal ground mixed grains. It proved less adapted for swine feeding and not more than 1 kg. daily per 100 kg. live weight should be fed.

Soy meal and soy cakes, N. Hansson (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 3, pp. 272–274; Centralanst. Jordbruksförsök Flygbl. 11, 1909, pp. 5*).—This is a discussion of the value of these two feeding stuffs, which contain, on the average, about 10.5 per cent moisture, 44.5 per cent protein, 3 per cent fat, 36 per cent carbohydrates, and 5.5 per cent ash.

Concerning the sampling of sunflower seed cake and its composition, G. Schuftan (*Ztschr. Offentl. Chem., 15 (1909), No. 7, pp. 121–123*).—The author reports analytical data.

Concentrated feeding stuffs, C. S. Cathcart, V. J. Carberry, and C. L. Pfersch (*New Jersey Stas. Bul. 220, pp. 3–69*).—During the year 526 samples of feeds were analyzed and included cotton-seed, linseed, peanut, corn and cob, and meat meals, corn, rye, oat, wheat and buckwheat products, corn sprouts, distillers' and brewers' grains, and cotton seed, gluten, poultry, condiments, proprietary and mixed feeds. The relative cost of guarantied and unguarantied feeds is tabulated.

"Three hundred and seventy guarantied samples were analyzed which would give 740 possible deficiencies and of this number 123 were found. There were 42 samples deficient in protein, 41 in fat, and 20 in both protein and fat. . . .

"The cheapest protein feeds this year were cotton-seed meal, peanut meal, buckwheat middlings, high-grade distillers' grains, linseed meal, dried brewers' grains, malt sprouts, and buckwheat bran."

Feeding stuff inspection (*Maine Sta. Off. Insp. 10, pp. 33–60*).—The requirements of the feeding stuffs inspection law are pointed out, and results of inspection for 1908–9 are reported. About 800 samples were analyzed, including cotton-seed and linseed meals, gluten, molasses, poultry and mixed feeds, beef scraps, distillers' grains, wheat bran, and middlings.

Effect of alcohol in the feed and drink of domestic animals, E. Pott (*Wiener Landw. Ztg., 59 (1909), No. 43, pp. 441, 442*).—This is a general discussion of the effect of alcohol on metabolism in the animal body.

Among the investigations discussed are those of Klingemann, who found that milch goats might be fed small quantities of wine without apparent effect on milk secretion but that larger quantities produced intoxication and diminished the flow of milk. Small quantities of alcohol were also found in the milk. In some parts of Italy and France wine is given to horses and mules; also beans for stock are soaked in wine for 24 hours before feeding. It is suggested that al-

though no ill effects may be observed from giving animals wine or distillery slop, yet after a time chronic alcoholic poisoning may result.

Pea silage feeding of lambs in Wisconsin (*Breeder's Gaz., 55 (1909), No. 22, pp. 1267, 1268, figs. 5*).—This is an account of satisfactory gains made by feeding lambs pea silage made from cannery waste.

The case for the goat, J. W. ROBERTSON-SCOTT (*London, 1908, pp. X+162, pls. 14*).—This is a popular treatise on goat keeping. Considerable space is devoted to the advantages of goat keeping for the small holder in England. An appendix consists of replies from 24 experts to a list of questions concerning the proper management of goats.

Feeding fermented cotton-seed meal to hogs, R. S. CURTIS (*North Carolina Sta. Bul. 200, pp. 5–16, figs. 4*).—This experiment was conducted to determine the amount of fermented cotton-seed meal which can with safety and economy be fed to hogs. Other feeds used in connection with the cotton seed were fermented shelled corn and linseed meal. Four lots of 6 pigs each were selected for the experiment, which lasted 6 months. The pigs were of mixed blood and averaged about 70 lbs. in weight.

During the first period lot 1, fed fermented shelled corn, consumed on an average 2.31 lbs. per head per day, and made an average daily gain per head of 0.18 lbs. at a cost of 18 cts. per pound. Lot 2, fed fermented shelled corn and cotton-seed meal 7:1, consumed daily 3.06 lbs. per head, and made an average daily gain per head of 0.46 lb. at a cost of 9.33 cts. per pound. Lot 3, fed fermented shelled corn and cotton-seed meal 4:1, consumed 3.22 lbs. of grain per head per day, and made an average daily gain of 0.63 lb. at a cost of 7.14 cts. per pound. Lot 4, fed fermented shelled corn and linseed meal 4:1, consumed on an average 3.22 lbs. of grain per head per day, and made an average daily gain of 0.6 lb. at a cost of 7.86 cts. per pound.

At the end of 6 months the rations of these lots were reversed and 1 pig in each lot was discarded. Lot 1, fed fermented corn and linseed meal 4:1, consumed 1.81 lbs. per head per day, and made an average daily gain per head of 0.21 lb. at a cost of 12.3 cts. per pound. Lot 2, fed the corn and cotton-seed meal 4:1, consumed daily 2.59 lbs. per head, and gained an average of 0.24 lb. at a cost of 15 cts. per pound. Lot 3, fed the corn and cotton-seed meal 7:1, consumed daily 2.98 lbs. per head, and gained an average of 0.25 lb. at a cost of 16.7 cts. per pound. Lot 4, fed the corn alone, consumed 2.87 lbs. per head per day, and made a gain averaging 0.36 lb. at a cost of 11.07 cts. per pound.

"Fermented cotton-seed meal can be fed in small quantities for limited periods, with very gratifying results. These experiments indicate that 75 to 90 days would be the limit of satisfactory feeding. This would depend, however, on the age and condition of the hogs, the supplementary feeds and the proportion of cotton-seed meal fed.

"Farmers would, according to the results of this experiment, be safe in feeding fermented cotton-seed meal to 75-lb. shoats in quantities ranging from one-sixth to one-fifth the total ration, by weight, for a period of 75 to 90 days.

"The practical application of these results would not be to feed under the conditions here described, but rather to feed the corn and cotton-seed meal in connection with grazing crops, which can be produced so abundantly by Southern farmers. This experiment was carried on under adverse conditions to render safe conclusions possible."

Further experiments with dried potatoes, W. SCHNEIDEWIND (*Illus. Landw. Ztg., 29 (1909), No. 42, pp. 421–423*).—In the first experiment reported 32 swine 6 months old were divided into 4 groups. The experiment lasted 84 days. With potato flakes the average daily gain per head was 0.68 kg., at a cost of 0.64 marks per kilogram (about 6.7 cts. per pound); with potato chips 0.71 kg.,

at a cost of 0.64 marks per kilogram; with maize meal 0.68 kg., at a cost of 0.58 marks per kilogram; and with sugar chips 0.59 kg., at a cost of 0.67 marks per kilogram.

In another experiment with the same number of swine, lasting 70 days, the average daily gains per head were as follows: With steamed potatoes and barley meal 0.71 kg., steamed potatoes and potato chips 0.70 kg., barley meal 0.71 kg., and barley meal and potato chips 0.73 kg.

Pig feeding experiments at Clonakilty Agricultural Station, 1907–8, J. L. DUNCAN (*Dept. Agr. and Tech. Instr. Ireland Jour., 9 (1909), No. 3, pp. 458–464*).—To determine the value of separated milk for pig feeding three lots of 13 pigs each were fed a basal ration, of meal containing equal parts of corn and barley. Lot 1 received a supplementary ration of potatoes and separated milk and made an average daily gain per head in 3 months of 1.88 lbs., returning a total net profit of £6 8s. 10d. (about $31.30). Lot 2 was fed skim milk for a supplementary ration, and in 3 months made an average daily gain per head of 1.95 lbs., returning a total net profit of £7 13s. 4d. Lot 3, which received potatoes as a supplementary ration, made an average daily gain per head in 5 months of 1.09 lbs., being fed at a total loss of £6 3s. 10d.

Feeding of pigs, H. W. POTTS (*Agr. Gaz. N. S. Wales, 19 (1908), Nos. 8, pp. 638–642; 10, pp. 808–812; 20 (1909), Nos. 1, pp. 26–31; 4, pp. 275–282*).—This is a series of articles on the value of alfalfa and other legumes, rape, potatoes, artichokes, sweet potatoes, cassava and other roots as feeds for pigs. Directions are given for the best methods of growing and feeding these crops under Australian conditions.

Hog raising in Colorado, H. M. COTTRELL (*Colorado Sta. Circ. 2, pp. 14*).—This is a brief popular account of the best methods of raising hogs in Colorado. A short list of books and bulletins on the subject is appended.

A fortune in eggs, L. F. VAN ORSDALE (*Syracuse, N. Y., 1908, pp. 67, pl. 1, figs. 24, chart 1*).—This is a popular work on poultry. Special attention is given to the use of trap nests as a means of improving the egg-laying qualities of the flock.

Poultry secrets, M. K. BOYER (*Philadelphia, 1909, pp. 56, figs. 9*).—This is a popular work on poultry.

Report of fourth egg-laying competition, F. H. ROBERTSON (*Jour. Dept. Agr. West. Aust., 18 (1909), No. 4, pp. 279–285*).—In a 9 months' contest the average egg yield per hen was 111.4 eggs, the cost of feed per hen $1.44, and an average profit over feed of $1.50. In a duck egg-laying contest the average yield was 128.8 eggs, the cost of feed per duck $1.44, and the average profit over feed $1.59.

The keeping of egg records (*Dept. Agr. and Tech. Instr. Ireland Jour., 9 (1909), No. 3, pp. 432–449*).—The advantages of keeping egg records are pointed out and complete monthly records are given of 125 flocks. The annual yield of eggs from these flocks ranged from 68 to 201.1 per hen.

Experiments with ostriches, J. E. DUERDEN (*Agr. Jour. Cape Good Hope, 33 (1908), No. 6, pp. 786–791, figs. 2; 34 (1909), No. 5, pp. 513–524, figs. 3*).—This contains a scientific glossary of technical terms used in describing various kinds of feathers, parts of the feather, commercial characters or "points" of a feather, and trade classification.

Evidence is presented to show that the feathers in a highly nourished bird may take longer to ripen but will be increased in length, and that a feather germ or socket once injured, either accidentally or by careless quilling, will probably never recover but continue to grow a malformed feather with each crop.

For earlier work see a previous note (E. S. R., 20, p. 473).

[Live stock in foreign countries], E. G. Babbitt, A. W. Thackara, and J. A. Smith (*Mo. Cons. and Trade Rpts. [U. S.], 1909, No. 345, pp. 81, 82*).—The latest available statistics of live stock in Japan are for the year 1905, which show a steady decrease in the number of animals since 1900, but there may have been an increase in the past 2 years owing to a movement encouraged by the government to improve the breeds of cattle and horses and to increase the number to meet the growing demand. The imports of live stock from the United States in 1907 were valued at $18,022. The Japanese use but little milk and butter and there is no demand for cheese except among the foreign residents and to supply hotels.

In Prussia during the past 3 years there has been an increase in the number of horses and cattle and a decrease in the number of sheep and hogs. In Italy the value of live stock was $350,044,000 in 1881 and $772,000,000 in 1908. This increase is accounted for in part by the improvement of the breeds and the higher prices of meat products.

Live stock statistics of Bavaria (*Beitr. Statis. K. Bayern, 1907, No. 72, pp. 135, maps 4*).—The statistics of live stock in Bavaria, taken in December, 1907, show a large increase in the number except for horses. The increase in cattle is noticeably large, being a gain of 219,543 since 1904.

DAIRY FARMING—DAIRYING—AGROTECHNY.

Soy beans and soy cakes, D. A. Gilchrist (*Mark Lane Express, 100 (1909), No. 4054, p. 667*).—This is a report of a feeding experiment to test the comparative value of soy bean and decorticated cotton-seed cakes as feeds for milch cows. The trial included 6 cows, and the basal ration consisted of hay, oat straw, crushed oats, and roots. With soy bean cake as a supplementary feed for 6 weeks the average daily yield of milk was 22.1 lbs. per cow. When decorticated cake was substituted for the same period the average daily yield was 21.6 lbs. per cow.

Soy bean cake, J. Hansen (*Deut. Landw. Presse, 36 (1909), No. 41, pp. 439, 440; 452, 453*).—In this experiment with 3 cows and lasting 6 weeks, soy bean cake from which the oil had been extracted was contrasted with linseed cake. The basal ration was composed of hay, bran, and sugar chips. The average yield per cow per day during two periods of 14 days each when fed the linseed cake was 13.14 kg. of milk, testing 3.45 per cent of fat. The corresponding yield during one period of 14 days with soy bean cake as the supplement was 13.55 kg. of milk, testing 3.33 per cent of fat.

Nuclear division in the milk glands of cattle, A. Zimmermann (*Ztschr. Fleisch u. Milchhyg., 19 (1909), No. 9, pp. 311–319, pl. 1*).—From his investigations the author thinks that mitotic division of the cells in the milk gland takes place during all stages of milk secretion, although it can be demonstrated only by taking great pains. Although 1,000 preparations were carefully made but 8 cases of mitotic division were found. A bibliography on the subject is appended.

On the factors which determine the increase in the function of the mammary gland, C. Foà (*Arch. Fisiol., 5 (1908), No. 6, pp. 520–556, figs. 2; abs. in Zentbl. Physiol., 22 (1908), No. 23, pp. 749, 750*).—Subcutaneous and intraperitoneal injections of extracts obtained from a bovine fetus were made for 20 days in virgin rabbits. At the end of 15 days there was a noticeable enlargement of the mammary gland. From the 2 rear glands a drop of milk could be pressed out on the last day. No such effect was produced when the extract was heated to 110° C.

The milk glands of a goat were nourished on one side with the blood of a lactating goat and on the other side by that of a virgin goat. No difference was found in the amount or composition of the milk of the 2 glands. No definite results were obtained as to the inhibitory effect on milk secretion of lactating rabbits by injecting extracts of a bovine fetus. The milk glands of guinea pigs were transplanted but no definite information was obtained.

The author concludes that the embryos of different species can stimulate the growth of milk glands, and therefore that the dissected hormones are not specific and that the milk glands reach their greatest development through embryonal hormones. There is no specific substance in the blood of a lactating female that stimulates the katabolic phase of milk secretion. The blood leads to the glands only the material.

On the origin of the lactose of milk, C. Foà (*Arch. Fisiol., 5 (1908), No. 6, pp. 533–556; abs. in Zentbl. Physiol., 22 (1908), No. 24, pp. 784, 785*).—The milk glands of 2 goats were removed but the results obtained were different from those of Bert and Porcher (E. S. R., 18, p. 671). No reduction took place in the urine, nor did hyperglycohaemia occur.

In a study of carbohydrates in the blood of rabbits and bitches the author found the same amount of glucose, glycogen, and invertible glycoproteids in the blood of normal and lactating females. Neither galactose nor lactose was present in the blood. In the blood which had flowed through the milk glands of lactating females there was less free and combined glucose than in the normal blood, while the amount of glycogen was about the same.

From these experiments and those of the article noted above, the author concludes that an invertible carbohydrate other than lactose and glycogen is present and also a carbohydrate which is united with a proteid but can be isolated with dilute acids.

The stereochemistry of lactic-acid fermentation, R. O. Herzog and F. Hörth (*Ztschr. Physiol. Chem., 60 (1909), No. 2, pp. 131–151*).—Nine species of lactic-acid bacteria were grown in media containing different sugars. The results indicate that the form of lactic acid produced depends not on the configuration of the sugar from which it was formed but on the nature of the ferment causing the reaction.

On the diastases of milk, F. Bordas and F. Touplain (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 16, pp. 1057–1059; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, pp. 538, 539; Rev. Gén. Lait, 7 (1909), No. 14, p. 333*).—It is stated that calcium caseinate can decompose hydrogen peroxid, and that if this action does not occur in boiled milk it is because the soluble casein of Duclaux is precipitated on the casein in suspension forming a coat which prevents the decomposition of the hydrogen peroxid. Therefore, it is not necessary to assume the existence of catalases and peroxydases in milk in order to account for the decomposition of the peroxid.

Contributions to the composition of buffalo milk, F. Baintner and K. Irk (*Biochem. Ztschr., 18 (1909), No. 1–2, pp. 112–141*).—Data are reported of a large number of analyses of the colostrum of buffalo milk, which does not differ essentially from that of the cow.

The milk of marsupiala, V. Ducceschi (*Arch. Fisiol., 5 (1908), No. 5, pp. 413–424, figs. 6; abs. in Zentbl. Physiol., 22 (1908), No. 24, p. 784*).—The milk of *Didelphys marsupialis* var. *Azaræ* has characteristics similar to that of higher mammals, but one noticeable difference is the high percentage of fat. It also contains a compound of phosphorus and protein which gives some of the reactions of casein but is not coagulable by chymosin. Pepsin but not chymosin was found in the stomach, a fact which does not lend support to the theory that they are identical.

Dairy school bulletin (*Ontario Dept. Agr. Bul. 172, pp. 71, figs. 7*).—This is a revised edition of Bulletin 143, previously noted (E. S. R., 17, p. 179). The additional and modified articles included are Milk and Cream Testing, by G. R. Taylor; Cheese Making, by A. McKay and C. H. Ralph; Creamery Butter Making, by F. Dean; Boilers, Engines, Steam Fitting, by G. Travis; Hand Power Cream Separators, by M. Robertson; Farm Cheese Making, by Laura Rose; and Soft Cheese Making, by F. G. Rice.

Report of the dairy institute at Hameln, P. VIETH (*Ber. Milchw. Inst. Hameln, 1908, pp. 42*).—This report consists chiefly of analyses of milk and milk products.

Report of the agricultural research laboratory at Jaroslaw, Russia, S. PARASCHTSCHUK (*Ber. Milchw. Untersuch. Lab. Jaroslaw Russ., 3; abs. in Milchw. Zentbl., 5 (1909), No. 5, pp. 228–232, chart 1*).—This is a report of analytical data on milk, butter, and cheese.

Report on an investigation as to the contamination of milk (*Beverley, England, [1908], pp. 113, pls. 9, fig. 1*).—The chief object of this investigation of the milk supply of the East and West Ridings of Yorkshire, England, was to determine the source of contamination of market milk. The work extended over an entire year in order to observe the varying local and climatic conditions. The methods of estimating the amount of sediment and number of bacteria are described. The results are presented in tabular form and show the number of bacteria belonging to each group.

Among the conclusions reached are the following: "Of the total organisms in the milk used by the consumer, the greatest number are contributed by the farmer. During railway transit, at the retailer's premises, and in the consumer's house smaller amounts are added, the amount in each instance being apparently about the same. Of the glucose-fermenting or intestinal organisms and the streptococci, by far the greatest number are added at the farm. The retailer adds a certain number, the consumer none. The sediment or 'dirt' gains entrance to the milk chiefly at the cow shed. In 86.8 per cent of the samples examined, there was no increase in the sediment when sold by the retailer, but a decrease in 68.8 per cent. The farmer was responsible for the bacilli enteritidis sporogenes (Klein) in the milk consumed in 66.6 per cent of the samples. In 11.1 per cent of the samples these bacilli were added by the retailer or the consumer, while in 22.2 the source was doubtful."

A bibliography of the literature on the subject is appended.

The relative proportion of bacteria in top milk (cream layer) and bottom milk (skim milk), and its bearing on infant feeding, J. F. ANDERSON (*Jour. Infect. Diseases, 6 (1909), No. 3, pp. 392–400*).—From bacterial counts it was found that top milk sometimes contains from 10 to 500 times as many bacteria per cubic centimeter as mixed milk. This preponderance of bacteria may explain why infants sometimes do not thrive on modified milk made from top milk. Centrifugally raised cream was found to contain more bacteria than cream raised by gravity.

Method of treating milk, J. L. GOUCHER (*U. S. Patent 352,810, Jan. 17, 1907. Off. Gaz. U. S. Patent Office, 141 (1909), No. 3, pp. 585, 586, fig. 1*).—A patent has been obtained for cooling milk and reducing the bacterial content by passing an alternating current of electricity lengthwise through a stream of milk in a closed chamber.

The influence of acidity of cream on the flavor of butter, L. A. ROGERS and C. E. GRAY (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 114, pp. 22*).—This is a study of objectionable flavors in butter kept in cold storage. Butter was made from pasteurized and unpasteurized cream of varying degrees of acidity and stored at temperatures of 32°, 10°, and —10° F.

"The butter made from unripened unpasteurized cream always developed a cheesy or rancid flavor. The butter made from ripened cream, both pasteurized and unpasteurized, developed cold-storage, fishy, and other flavors typical of storage butter. In all cases the overripe butter showed marked deterioration. The butter made from pasteurized cream without starter usually retained its flavor with little or no change. Even at 32°, where all the ripened butter showed decided changes, the sweet-cream butter deteriorated very little. . . .

"The difference between butter made from pasteurized sweet cream and that from ripened cream, both pasteurized and unpasteurized, became very marked after holding in a warm room for a short time. Butter made from pasteurized cream with starter added, after the so-called Le Clair or Credicott method, retained its fresh flavor better than the ripened-cream butter, but was not quite equal in keeping quality to that made from sweet pasteurized cream."

Determinations of bacteria were made, but none were found which could be expected to influence the flavor.

"In all the butter stored at 10° and —10° there was a gradual decrease in the total bacteria. This was usually slightly more rapid at the higher temperature, but this difference in the rate of decrease was sometimes obscured by errors, due largely to the difficulty of securing a representative sample. At 32° this decrease was usually much more pronounced than at the lower temperatures. In several cases, however, there was an actual increase confined chiefly, if not entirely, to the torula group of yeasts. In one package the development was sufficient to make an actual increase in the total number of bacteria, which in the ordinary technique includes yeasts as well as bacteria. Usually the growth of yeasts was so much less than the decrease in bacteria that the total number showed a decrease. It has been demonstrated that some members of this group of yeasts may cause a decomposition of butterfat."

Butter made from pure cream heated to temperatures high enough to destroy all enzyms developed a rank fishy flavor; hence, it was concluded that the deleterious effect of high acidity was not due to any organism, enzym, or other substance which can be destroyed by heat. Apparently some by-product of bacterial growth unaffected by heat had a marked influence on the flavor of the butter. Probably this was a by-product of the lactic-acid bacteria and the by-product was lactic acid itself.

When lactic, acetic, and hydrochloric acids were added to different lots of cream the butter made from each lot to which these acids had been added showed undesirable flavors.

"It would appear, therefore, that the acidity of the cream has a direct influence on the changes in the butter. . . . To the person interested in the application of these results to practice it is obvious that butter which market conditions require to be held for any length of time should be made with as little acid as possible. This is especially true of butter held for several months in cold storage and butter canned for use on shipboard or for export to tropical countries."

The keeping quality of butter made from sweet pasteurized cream was compared with that of butter made with a starter. The results showed that when stored at 10° and —10° there was little or no change in the sweet-cream butter over that with the starter, but at 32° there was a decided difference in the flavor of the sweet-cream butter. A comparison was also made with butter for immediate consumption.

"The difference in favor of the sweet-cream butter was greater in the butter 8 or 10 days old at the time of scoring, while in the butter scored immediately after making the highest score was given to the butter with starter.

"In churning sweet cream it is essential that careful attention be given to the churning temperature and to the speed of the churn, otherwise there is likely to be an unnecessary loss of fat in the buttermilk. Care should be taken in storing butter made from sweet cream to guard against woody or other extraneous flavors, which are likely to be more noticeable in this mild-flavored butter than in butter with a high flavor."

"Butter can be made commercially from sweet pasteurized cream without the addition of a starter. Fresh butter made in this way has a flavor too mild to suit the average dealer, but it changes less in storage than butter made by the ordinary method, and can be sold after storage as high-grade butter."

The keeping of butter in cold storage, W. S. SAYER, O. RAHN, and BELL FARRAND (*Centbl. Bakt. [etc.], 2. Abt., 22 (1908), No. 1–3, pp. 22–32; Pure Products, 5 (1909), No. 4, pp. 181–186*).—In the experiment reported the samples tested consisted of renovated butter, normal dairy butter purchased in the market, and butter made at the Michigan Station from pasteurized and unpasteurized cream.

There was a small increase in acidity in all samples when kept above the freezing point for 8 months. There was no increase in free acid in normal butters kept below the freezing point, except with those samples made in poorly managed dairies. Many samples were rancid though no free acid was formed, therefore rancidity of cold-storage butter does not depend on the hydrolysis of milk fat.

The butter was scored by experts in a fresh condition and after 5 and 8 months' storage. At the end of 8 months the majority of the samples kept above the freezing point were completely spoiled. The other samples were rated from 83 to 92. Neither salt content nor water content seemed to affect the keeping quality.

A bacterial examination showed that the number of acid bacteria stands in close relation to the salt content, when the salt is calculated in percentage of the water content of the butter and the number of living bacteria is calculated in percentage of the bacteria present in fresh butter. The bacteria were better preserved in a high salt concentration because in weaker solutions the freezing point is higher and the bacteria were frozen. This confirms the observation of Gray (E. S. R., 18, p. 76), that below the freezing point lightly salted butter keeps better than that strongly salted.

On the presence of p-Oxyphenylethylamin in Emmenthal cheese. Fourth contribution on the constituents of Emmenthal cheese, E. WINTERSTEIN and A. KÜNG (*Ztschr. Physiol. Chem., 59 (1909), No. 2, pp. 138–140; abs. in Rev. Gén. Lait, 7 (1909), No. 14, p. 333*).—Small amounts of p-Oxyphenylethylamin were found in the lysin fraction of an abnormally ripe Emmenthal cheese. It probably results from the decomposition of tyrosin by the action of bacteria.

Process for the manufacture of cheese, J. RAGUET (*French Patent 395,417, Oct. 17, 1908; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 539*).—A French patent has been obtained for making skim-milk cheese.

"Skim milk is treated with rennet and heated to a temperature of about 40° C., and the curd is separated, drained, pressed, and finely subdivided. It is next placed in closed vessels and allowed to ferment, the mass being stirred occasionally to prevent the formation of lumps. Each kilogram of the fermented mass is then mixed with 600 cc. of water containing 20 gm. of sodium chlorid; the temperature is maintained at 40 to 50° until all lumps have disappeared and is then raised to 80°, in order to melt the mass. While still hot the product is transferred to molds, cooled, taken out of the molds, coated with starch or flour, and colored."

Preservation of butter, margarin, tallow, fats, oils, and other substances which are oxidized when in contact with air by separating some of their constituents, MONTÉRAN (*French Patent 395,810, Jan. 7, 1908; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 539*).—By this process, which has been patented in France, the butter or other fat is melted in an atmosphere of carbon dioxid. The water is then separated from the fat and the carbon dioxid is removed by an exhaust pump.

Glucose-treated parchment paper for packing butter and margarin, O. VON BOLTENSTERN (*Ztschr. Spiritusindus., 32 (1909), Nos. 10, pp. 99, 100; 16, pp. 174, 175; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 539*).—Parchment paper for wrapping butter and margarin can be rendered pliable by dipping it into liquid glucose. Although the fluid is a good medium for the growth of molds, no trace of the characteristic odor of molds could be detected after storing for some days in such paper.

Report on milk bottle washers and other dairy appliances, B. MARTINY (*Arb. Deut. Landw. Gesell., 1908, No. 156, pp. 76, figs. 32*).—Several bottle washers, milk wagons, separators, a combined churn and worker, and a milk-can washer are illustrated and described.

Triple sterilization as applied to canning corn, W. A. P. MONCURE (*Virginia Sta. Rpt. 1908, pp. 122–124*).—This experiment in discontinuous or triple sterilization of corn was made to discover some method of destroying bacteria without subjecting the corn to a temperature of 240° F. for about 50 minutes, which injures the natural color and flavor. When boiled at 212° F. for 3 successive days for 70 minutes, the contents of all the cans were preserved. When boiled for 60 minutes about half, and for 50 minutes or less the contents of all, of the cans were spoiled. This method of boiling for 70 minutes on 3 successive days is recommended for home canning, but may not be practical in factories unless a fancy product is desired. Detailed methods of canning have been given in a bulletin previously noted (E. S. R., 15, p. 581).

Tapioca and palm starches for paper making, F. VIRNEISEL (*Papier Fabrik., 7 (1909), No. 14, pp. 335–338; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 8, p. 439*).—The author has investigated these starches, which are employed for textile finishes, and thinks that in Germany they may be used for paper making. They are better for this purpose than potato starch and cheaper than cereal starches.

The domination of fermentation by the use of selected yeasts, W. A. P. MONCURE and W. B. ELLETT (*Virginia Sta. Rpt. 1908, pp. 99–122, pls. 5, figs. 4*).—The causes of the chemical changes that take place in the transformation of a fruit juice into an alcoholic beverage are discussed in a general way, and a continuation of earlier work is reported (E. S. R., 18, p. 373).

The individuality of yeasts as indicated by the daily loss of carbon dioxid and by analyses of the fermented ciders was studied in laboratory experiments and in cellar experiments, identical results being secured. "It is proper to infer that the characteristics of a yeast type are permanent and fixed. . . . It is also significant that the characters should be the same under the widely varying conditions governing the two experiments." One apparent contradiction was noted, however. In the laboratory experiments the alcohol present as the result of the domination of the natural ferments was practically the same as that resulting from the domination of yeast No. 37, but yeast No. 66 produced a very much higher percentage; whereas in the cellar experiments all the percentages were practically the same. "We may account for this result only by taking into consideration the immature or green state of the original must.

This may not be the true cause. Further work may be necessary to determine this absolutely."

To determine the extent to which fermentation can be influenced in unsterilized must by the use of selected yeasts, 400 cc. samples of must were inoculated with different quantities of selected yeasts. The results were remarkably uniform, ½, ¾, and 1 cc. sowings producing the same results. "It requires only one part of yeast to 800 parts of cider to dominate fermentation. It is safe, therefore, to conclude that one part of yeast to 400 parts of cider will in all cases control fermentation in a must made from apples free from rot."

In the cellar experiments with a mixture containing yeasts Nos. 37 and 66 no trace of the influence of No. 66 could be detected. These experiments indicated that sterilization of the must was unnecessary.

The conclusions of the authors are summarized as follows: "Natural fermentation may or may not yield a good result. For, beyond limiting the rapidity of fermentation through the medium of temperature, and the prevention of unnecessary contamination, one has absolutely no control over the resultant cider. The dominant ferment determines the quality of a fermented cider. Yeasts have individual characters and produce ciders having definite characteristics. The characters of yeasts are fixed and permanent, and are evidently under widely different conditions governing fermentation."

Report on Collettes' process for extracting juice from beet roots in the distillery, LINDET (*Bul. Soc. Encour. Indus. Nat.* [*Paris*], *111* (*1909*), *No. 3, pp. 468–472, fig. 1; abs. in Jour. Soc. Chem. Indus., 28* (*1909*), *No. 9, p. 487*).—"The advantages possessed by the process patented by A. G. and R. Collette . . . are the small cost of installation, the automatic working, the reduction of manual labor, and the thorough extraction attained. The amount of juice extracted (130 to 150 liters per 100 kg. of beet root), and the degree of extraction (0.2 per cent of sugar being left in the exhausted cossettes), are such as are obtained under the best conditions of the diffusion process. The process is not suitable for sugar manufacture, since, owing to exposure to the air, the juice would be darkened by the oxydases of the beet root, and the treatment with sulphuric acid, which prevents this in the distillery process, should not be permitted in the sugar house."

Distillation of cane sugar molasses in Cuba, R. DEMUTH (*La. Planter, 42* (*1909*), *No. 22, pp. 341, 342, chart 1*).—Experiments with alcoholic fermentation of cane molasses with yeasts are reported and the feasibility of making alcohol from molasses is discussed. The author states that a gallon of molasses worth 3 cts. in Cuba can be converted into ½ gal. of alcohol worth 10 cts. at a cost of not over 1 ct.

Helianthus tubers as a material for the production of spirit, J. KOCKS (*Ztschr. Spiritusindus., 32* (*1909*), *No. 15, pp. 161; abs. in Jour. Soc. Chem. Indus., 28* (*1909*), *No. 9, p. 487*).—"Analysis of various samples of Helianthus tubers shows that they contain 27.38 to 27.98 per cent of dry substance, which consists of 11.69 to 14.06 per cent of protein, 8.11 to 13.60 per cent of sugar (levulose), 58.33 to 60.52 per cent of inulin (and other substances yielding sugar on hydrolysis with acids), and small proportions of fat, ash, and cellulose." The author determined the yields of alcohol obtained from the fermented juice and from the tubers. The amount obtained from the tubers fermented with sulphuric acid varied from 7.9 to 8.83 per cent.

Yearbook of the German associations of alcohol and starch manufacturers and potato driers (*Jahrb. Ver. Spiritus Fabrik. Deut., 9* (*1909*), *pp. XVIII–594*).—This is the annual report of the progress and present status of the alcohol, starch, and potato drying industries in Germany.

VETERINARY MEDICINE.

Third interim report of the royal commission appointed to inquire into the relations of human and animal tuberculosis, F. GRIFFITH ET AL. (*Roy. Com. Tuberculosis, Third Interim Rpt., 1909, pp. 38*).—Experiments were conducted with the view of obtaining information regarding the excretion or discharge of tubercle bacilli in the milk and feces of tuberculous cattle. The investigations here reported have been summarized as follows:

"The feces of 5 naturally tuberculous cows, out of the total number of 6 so far investigated, have been found to contain living and virulent tubercle bacilli. Three of these animals, cows B, C, and F, were severely diseased and were eliminating large numbers of tubercle bacilli; this is shown by the occurrence of tuberculosis after the inoculation of very small doses of fecal matter in all but one of the guinea pigs which survived a sufficient length of time, and by the fact that all the swine fed became tuberculous. Two of the cows, A and D, were in apparently excellent condition of health. One, cow A, showed after death a caseous and cystic posterior pharyngeal gland, a few small nodules in the intestine, and slight disseminated tuberculosis. The feces of this animal caused tuberculosis in 1 out of 4 swine fed; the other 3 swine and all the guinea pigs inoculated remained healthy. The other cow, D, had tuberculosis of the lungs, bronchial and mediastinal glands, without any disease elsewhere. The feces of this animal caused tuberculosis in 3 guinea pigs and 2 rabbits; 2 swine fed remained healthy. The feces of the sixth cow, E, which had slight tuberculosis of the lungs and a mediastinal gland, did not give rise to tuberculosis in any of the animals inoculated.

"Four cows, A, B, C, and F, out of the 5 cows which gave positive results showed some tuberculosis of the alimentary tract, but in at least one case, cow C, it was not sufficient to account for the large numbers of tubercle bacilli in the feces. These bacilli must have been coughed up from the lungs and swallowed.

"Tuberculosis was present in the uterus of each of the severely infected cows and the uterine discharge contained numerous tubercle bacilli. Such a condition constitutes another source of infection. The milk of two of the cows, B and C, caused, though not invariably, tuberculosis in guinea pigs inoculated with relatively small doses. The milk was withdrawn from the udder by catheterization, and post-mortem examination of the udders revealed no macroscopic evidence of tuberculosis. Small pieces were examined histologically by Dr. Eastwood and were found to be normal, but it is of course impossible positively to exclude microscopical lesions. The milk of a third cow, F, caused severe tuberculosis in every guinea pig which lived a sufficient period of time after inoculation. The udder, except for four small nodules in the left hind quarter, was normal to the naked eye; the animal was very ill at the time the milk was collected. The milk of the remaining 2 cows, D and E, tested did not give rise to tuberculosis in any of the animals inoculated."

Eleventh annual meeting of the Interstate Association of Live Stock Sanitary Boards (*Proc. Interstate Assoc. Live Stock Sanit. Bds., 11 (1907), pp. 95*).—In the president's annual address (pp. 7–11), D. F. Luckey briefly considered the contagious diseases of live stock, meat inspection, etc. A discussion on the State control of hog cholera, led by C. E. Cotton, was entered into by P. O. Koto, C. G. Lamb, T. Butler, and others (pp. 11–26). A paper on tick eradication, by T. Butler (pp. 27–40), considers the importance of eradication and the methods by which it may be accomplished.

A. D. Melvin briefly discussed the Federal meat inspection (pp. 41–43), and J. M. Wright, State meat inspection (pp. 43–46). A paper was presented by

O. E. Dyson (pp. 46–54) on the purchase of cows for slaughter subject to post-mortem inspection. The Relation of the State Veterinary Surgeon and the Live Stock Sanitary Board to the Public Health was considered by C. G. Lamb (pp. 54–59). Other papers presented are Rabies and its Control, by A. Peters (pp. 59–73), Animal Parasites, by J. G. Ferneyhough (pp. 73–75), and a Review of Federal Work in Tick Eradication, by R. P. Steddom (pp. 75–81).

The resolutions adopted and reports of the sanitary conditions in the various States are included.

Report of the veterinary director general and live stock commissioner. J. G. RUTHERFORD ET AL. (*Rpt. Vet. Dir. Gen. Canada, 1908, p. 144*).—This is a report for the 2 years ending March 31, 1908.

The progress made in the work of stamping out hog cholera is said to have been both satisfactory and encouraging. A few restricted outbreaks occurred in Ontario, some of which took place in the old quarantine area and were evidently traceable to chronic cases unsuspected and of long standing. In another instance a group of small outbreaks near the frontier was directly traceable to the feeding of swill from a large summer hotel, the provisions used in which were largely imported.

Cattle imported into Canada for breeding purposes or milk production are tested in quarantine except in the cases of cattle from the United States, which are admitted on inspection when accompanied by a satisfactory test chart signed by an inspector of the Bureau of Animal Industry of this Department. Officers of the Department test similar classes of cattle exported to the United States. All reactors are permanently earmarked and their exportation prohibited.

There has been a considerable decrease in the number of cases of glanders. During the 12 months ending March 31, 1907, nearly 250 fewer horses were slaughtered than in the similar period ending October 31, 1905, while the figures for the 12 months ending March 31, 1908, show a decrease of more than 550 over the 1907 figures. The author states that he is convinced that the disease is being systematically and thoroughly eradicated.

The experiments on pictou cattle disease at the Nova Scotia station were continued in order to secure definite information as to the value of sheep, and incidentally of other animals, as agents in the extirpation of ragwort. Mange in cattle still prevails to a somewhat serious extent in southern Alberta and southwestern Saskatchewan. The number of horses slaughtered because of dourine has decreased from 412 in the previous 17 months to 216 in the following 24 months. Mange in horses was prevalent to a small extent in certain districts of Quebec, while a few cases were also dealt with in the provinces further west.

A number of cases of sheep scab were detected, all being confined to western Ontario. Several outbreaks of anthrax were reported in the provinces of Ontario and Quebec and the disease also appeared on one farm in New Brunswick. Black quarter prevailed to a certain extent in different provinces. Rabies made its appearance in a number of different districts throughout the dominion. Several outbreaks occurred in the Niagara peninsula, some of which were traceable to dogs from the United States. The results of export inspection and import testing are reported in detail. The inauguration of the inspection service under the provisions of the meat and canned foods act, which was passed in 1907, is considered the most noteworthy matter dealt with in this report.

In the report of the pathologist (pp. 59–69, 77–98), C. H. Higgins considers the investigations conducted and specimens examined. The amount of tuberculin dispensed from the laboratory shows a slight increase over the amount in previous years and totals 5,430 doses. During the course of investigations non-pathogenic trypanosomes were found in the blood of cotton-tail rabbits and in field mice. A special report on hoo poisoning by G. Hilton (pp. 107–115), one on

redwater investigations in British Columbia, by T. Bowhill (pp. 115–118), one on glanders by J. G. Rutherford (pp. 120–136), and the reports of special inspectors are included. An account of the commercial live stock industry in western Canada, by J. F. Robb (pp. 136–141), concludes the report.

Report of the division of animal industry, V. A. Norgaard (*Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 4 (1907), pp. 99–202, pls. 6; also Reprint*).—This is the third annual report of the veterinarian.

The most important work of the division is that of the inspection service, which was established for the purpose of preventing the introduction of diseased live stock in the Territory. Rules and regulations governing the importation of live stock, which are said to have been completely revised during the year, are considered. Attention is called to the necessity of compulsory testing of cattle with tuberculin by Federal inspectors before shipping upon the mainland. The importation of dressed meats and dairy products is briefly noted, as is the importation of live stock from New Zealand.

The author reports that apparently there has been less disease in the live stock during the past year than during the two previous years. The year was unusually favorable for the recovery of horses from osteoporosis or big head. Glanders is said to have caused considerable loss, two outbreaks with respectively 10 and 12 cases having occurred, besides a number of scattering cases, principally on the islands of Hawaii and Oahu. An account by H. B. Elliott under the title Observations Regarding Glanders on the Island of Hawaii, is given. Other diseases considered include epizootic laryngitis in horses, actinomycosis, eye disease in cattle, enzootic stomatitis in horses, and lead poisoning in cattle. Information here presented upon the insect pests of live stock has been previously noted from another source (E. S. R., 21, p. 160). Encouragement is said to have been given to mule breeding.

Report of the government veterinary bacteriologist, A. Theiler (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 55–97*).—Further investigations into the disease caused by *Piroplasma mutans*, are first considered. "Although *P. mutans* may be seen in smears, yet, unless every other cause can be excluded, it can not safely be said that the animal is suffering at that particular time from *P. mutans*, and should it die that the cause of death is this form of gall sickness. For instance, in an infection with heartwater complicated with *P. mutans*, the former can not be determined from a microscopical examination alone owing to its cause being ultravisible; in fact, any disease with a high fever reaction may be responsible for the appearance of *P. mutans* in an animal immune against this parasite." It is said to have become necessary that a better means of differentiating between *P. parvum* and *P. mutans* be worked out.

Having obtained the pure infection of *P. mutans* it is now possible to make further experiments to elucidate the course of the disease and the relation of ticks to its transmission. Various attempts made to discover a way other than by tick infestation of transmitting the East Coast fever from a sick to a healthy animal have all failed.

In order to determine the effect of cold upon ticks infected with East Coast fever, experiments were conducted. "The results of these experiments were that (1) a temperature of 0° C. retards the hatching of brown ticks into adults, (2) a temperature of 0° does not interfere with the development of the parasite within the engorged nymphæ, (3) a temperature of 0° does not kill the virus contained in engorged nymphæ of the brown tick. In no instance was any difference noted in the virulency of the disease; the only point of interest was that the ticks kept at a low temperature molted at a later date than the controls, but when the former were placed on susceptible cattle these animals promptly contracted the disease and died. In the light of this experience the

conclusion might be drawn that it is not the cold which interferes with the development of the parasites in the tick, but there are reasons to believe that notwithstanding the severe cold to which the ticks are subjected that it had not been acting for a sufficient length of time; indeed, under the conditions of the high veld it is probably not the sudden influence of the extreme cold but the combined effect of a low temperature during the night followed by the warmth of the sun in the daytime."

The inoculation of sheep against bluetongue was very successful. Up to February, 1908, over 80,000 doses had been issued to the Transvaal farmers, while over 100,000 doses were distributed among other South African colonies.

Further experiments with biliary fever of equines are briefly reported. Out of 72 horses and 76 mules inoculated with donkey foal blood of the fourth generation and upward, none died of biliary fever, showing that the inoculation can be done with safety. Its use is recommended for practical purposes. The conclusion was drawn that in practice it will be necessary to pack horse-sickness virus in small bottles in order to enable the district veterinary surgeons to utilize the material out of a fresh bottle for each batch of injections and thus prevent recorking. Besides horse sickness there are other fevers observed in horses, fevers which may be accompanied with high temperature reactions and high pulse and which, on first sight, simulate horse sickness, but which in reality have nothing to do with that disease.

Inoculations of mules with polyvalent virus and the results in practice for the season 1907–8 are reported. Out of 2,419 mules inoculated with polyvalent virus, and of which 2,310 recovered and were exposed in the Transvaal, 18 deaths, or 0.7 of 1 per cent, occurred after discharge, of which nearly all occurred in one particular lot of mules.

Microscopical and pathological anatomical examinations made during the year are also reported. During the year 283,184 tubes of calf vaccine lymph were issued. A brief report of the assistant government bacteriologist, W. Frei, is given in Appendix A, and that of the superintendent, E. B. H. Parkes, in Appendix B.

Report of the principal veterinary surgeon, C. E. Gray (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 41–54, map 1*).—Satisfactory progress is said to have been made with the work of pushing back the East Coast fever. Everywhere the number of infected farms has been reduced, even in those parts of the country which are principally inhabited by natives. The position of the colony in respect to lung sickness continues to be satisfactory, although the disease is still prevalent in Cape Colony. Restrictions on the importation of cattle from Cape Colony and the Bechuanaland Protectorate are still maintained. Only three outbreaks of tuberculosis were dealt with during the year. Hog cholera and swine plague were reported but once each. Only 13 sporadic cases of anthrax were recorded and in no locality did it show a tendency to assume an epidemic character. Much remains to be done in the eradication of scab. Decreases are reported in the number of outbreaks of glanders and ulcerative lymphangitis.

The loco-weed disease of the Plains, C. D. Marsh (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 112, pp. 130, pls. 11, figs. 29*).—Part 1 of this work is devoted to a historical summary and review of the literature on the affection and descriptions of *Aragallus lamberti* and *Astragalus mollissimus*, the plants to which the experimental work was limited. Part 2 is a technical report on prolonged field feeding investigations carried out at Hugo and Woodland Park, Colo., and at Imperial, Nebr., in cooperation with the Colorado and Nebraska Stations. Part 3 is devoted to the results and conclusions. The feeding experiments consisted in grazing cattle and horses upon pastures containing loco weed in comparison with others fed on pastures free from the loco weed, as well as feeding the loco plants

in the corrals, and making as extensive autopsies upon locoed animals as possible. The experiments were intended (1) to prove whether the loco weeds would poison or not, (2) to demonstrate the symptoms of loco poisoning and the pathological lesions accompanying it, and (3) to determine whether or not remedial measures could be instituted for the relief of the loco-infested area.

The conclusions reached as the result of the work of three seasons are summarized as follows:

"There is no longer any question in regard to the poisonous properties of the loco plants. It was clearly demonstrated that animals eating these plants would succumb sooner or later to their poisonous action. . . .

"It was found that the symptoms of the loco disease were essentially like those which had been mentioned by the majority of stockmen. . . . The more prominent symptoms are a staggering and uncertain gait, caused by a general disturbance of the nervous system, which leads in some cases to an apparent partial paralysis of the limbs and to a very distinct lack of muscular coordination. The animals eating loco eat more and more of it, although they do not in all cases acquire a passionate love for the weed, and sooner or later lose flesh and die of starvation.

"In the post-mortem examinations it was found that there were certain quite definite lesions. The animals were strongly anemic. This anemia was indicated not only by paleness of flesh and actual loss of blood, but by serous deposits in various parts of the body. The blood was found to be poor in hemoglobin and commonly rather rich in leucocytes. A diseased condition of the stomach was a common accompaniment of the locoed condition, this being marked in cattle by ulcers in the fourth stomach. All the body fluids are rather unusually abundant, and this is particularly true of the fluid of the epidural space of the spinal canal, which is commonly more or less organized, so that the spinal canal frequently seems to be filled with a jelly-like substance. There is a hyperemic condition of the central nervous system, which in acute cases is accompanied by clots in the lateral ventricles. In females diseased ovaries are common.

"The common loco plants in Colorado and adjacent territory are *Aragallus lamberti* and *Astragalus mollissimus*. . . . The results of the experiment showed very clearly that *Astragalus mollissimus* was much the more virulent. . . .

"Horses, cattle, and sheep are somewhat differently affected by these plants. In regions covered with *Astragalus mollissimus* the only common locoed animals are horses. Horses which eat this plant become poisoned ordinarily rather quickly and may die in a comparatively short time. Both cattle and horses eat *Aragallus lamberti*, but cattle, perhaps, rather more freely than horses, so that in regions where *Aragallus lamberti* is the more common loco plant the cattle are much more commonly affected than horses. . . . Sheep eat both species, but for them also *Aragallus lamberti* is the more dangerous, inasmuch as they are more apt to eat this plant than *Astragalus mollissimus*.

"It was found that there is a great difference in the individual susceptibility of animals to the loco poison, although most of them will succumb to the temptation and perish from its effects sooner or later. In regard to different breeds of animals there is a distinct difference, although the observations were not extensive enough for any broad generalizations. Generally speaking, the better-bred animals are more likely to be poisoned than those that have become accustomed to the country. Among sheep, black-faces yield much more quickly than Merinos. Among cattle, Durhams and Aberdeen-Angus were found to yield more quickly than Herefords.

"In regard to remedial measures, the work of the experiment gives quite definite suggestions. It is clear that where land is sufficiently valuable to

make it profitable to pay for that amount of labor, it is entirely feasible to cut out all of the loco weeds. This is particularly easy in regard to *Astragalus mollissimus*, because it grows in comparatively small patches. Where *Aragallus lamberti* is abundant the work would be more difficult, and in some cases the land is hardly worth the expense of the labor. It is evident that in the case of fenced pastures it frequently will be profitable to destroy the loco weeds in this way.

"Some locoed animals will recover if taken from the weed and fed well, without any treatment.

"Most locoed animals will recover if they are taken from loco, fed carefully, and treated on the lines indicated by our experiments.

"In all cases care should be taken to relieve constipation, either through the character of the food or by the use of magnesium sulphate.

"Horses are best treated with Fowler's solution in daily doses of 15 cc., continued for at least one month.

"Cattle are best treated with daily doses of strychnin, the doses not exceeding three-twentieths of a grain, given hypodermically, and continued for one or two months. It is especially important that the dose should be small, as locoes are very susceptible to the bad effects from overdosing."

An extensive bibliography is appended.—A companion bulletin dealing with laboratory experiments has been previously noted (E. S. R., 20, p. 280).

Lymphatic glands of the ox, J. F. Craig (*Vet. Jour., 65 (1909), No. 408, pp. 279–286*).—A contribution to the study of the lymphatic glands.

Johne's disease in cattle, C. W. Townsend (*Vet. Rec., 21 (1909), No. 1094, pp. 870–872*).—The author believes this disease to be more prevalent in the fen districts than in other parts of England.

Filtration experiments on the virus of cattle plague with Chamberland filters "F," E. H. Ruediger (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 1, pp. 37–42, charts 5*).—"From the experiments previously reported [E. S. R., 20, p. 1188] and those recorded here it is evident that even on carefully selecting the most porous of the Chamberland filters, marked "F," none have been found which allowed the virus of cattle plague to pass."

Filtration experiments with Bacillus choleræ suis, C. N. McBryde (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 113, pp. 31, fig. 1*).—Two series of filtration experiments with bouillon cultures of *B. choleræ suis* carried out by the author in order to determine whether filters of the Berkefeld and Pasteur-Chamberland type can be relied upon absolutely to restrain the bacillus are here described in detail.

In view of the results obtained the author concludes:

"(1) That Pasteur-Chamberland filters F and B effectually prevent the passage of *B. choleræ suis.*

"(2) That the smaller Berkefeld laboratory cylinders vary in permeability.

"(3) That certain of the Berkefeld laboratory cylinders will prevent the passage of *B. choleræ suis* when a limited amount of material is filtered.

"(4) That the granules noted in cultures of *B. choleræ suis* have no significance in filtration experiments with this organism.

"(5) That in the filtration experiments described in Bulletin 72 [E. S. R., 17, p. 87], the filtrates employed did not contain *B. choleræ suis.*

"(6) That hog cholera is due to an ultra-visible virus sufficeintly small to pass through the pores of the Chamberland filter."

Pyemic arthritis, J. Spencer (*Virginia Sta. Rpt. 1908, pp. 125–130*).—Details are given of a number of cases, representing all degrees in severity of attack, that were treated with antistreptococcic serum.

The author concludes that "pyemic arthritis may arise from either a pyemic or septic infection; that one or both may be present at the same time in the same subject; that the septic form assumes a more acute type, and usually terminates fatally within a few days; that the pyemic infection will yield readily to potent cocci antitoxin, and we believe will be much assisted in a more rapid convalescence by conjunction with nuclein, especially in weakly foals; that large doses of serum should be employed early and discontinued as soon as resolution is established."

The history of glanders in the French army, L. MAGNIN (*Rev. Gén. Méd. Vét., 12 (1908), No. 139–140, pp. 396–412*).—This history is based on statistics from the commission on equine hygiene and the reports of the veterinary chiefs of the service.

Dourine (*Dept. Agr. Ottawa, Health Anim. Branch, Spec. Rpt. Dourine, 1907, pp. 63, pls. 18, charts 3*).—A short historical review of the occurrence of this disease in Canada, where it has for several years existed to a limited degree among horses in certain districts in southern Alberta and in one locality in southwestern Saskatchewan, is presented by J. G. Rutherford (pp. 3–6) and the clinical and pathological features of the disease as occurring in cases studied are reported by C. H. Higgins (pp. 7–31). The first demonstration on the North American continent of the presence of *Trypanosoma equiperdum* in naturally infected cases of dourine is said to have been that of Watson and Gallivan, which is here reported. With this discovery it was definitely determined that the disease is identical with the dourine of other countries.

The demonstration of this parasite is largely a matter of obtaining suitable cases coupled with systematic experiments and close observation. The possibility of diagnosing the disease by purely clinical means is considered as fully established. As with sleeping sickness, it is believed that the lesions produced in cases of dourine are due to a large extent to the toxin present. "Certain bodies have been observed in some of the preparations taken by Watson, and later studied by both of us, which may be trypanosomata in an involution stage. I can not agree with Thiroux and Teppaz, however, that the red granules seen in the large mononuclear lymphocytes of horses (when stained with eosin and methylene blue in any of its combinations), represent the remains of trypanosomata, for we have observed these granules almost without exception in smears taken from the general and peripheral circulation of healthy horses."

The pathological anatomy and blood examinations of the cases studied are reported in detail. E. A. Watson reports a case of dourine with experimental inoculations and miscellaneous notes on the symptomatology and diagnosis (pp. 32–51). In Appendix A several cases of natural dourine are reported (pp. 52–54). In Appendix B, a brief report made by E. T. Davison to the Bureau of Animal Industry of this Department, concerning an investigation of the disease at Lethbridge, Alberta, is given (p. 55). Appendix C contains an article on the identity of dourine by Schneider and Buffard (pp. 56, 57), previously noted (E. S. R., 17, p. 809).

Trypanosomiasis of horses at Tonquin, HALLOT (*Rev. Gén. Méd. Vét., 12 (1908), No. 135–136, pp. 129–147, figs. 6*).—The author here reports a series of enzootics which he has studied in Tonquin, French Indo-China. In horses the disease terminates in death, while with cattle it is nearly always benign. The author has experimentally infected the guinea pig, rat, dog, and calves with the equine virus. In transmission experiments tabanids conveyed the disease from an infected to a healthy guinea pig. Experiments with Stomoxys resulted negatively.

The treatment of trypanosomiases in horses by orpiment alone or in connection with atoxyl, A. Thiroux and L. Teppaz (*Ann. Inst. Pasteur, 23 (1909), No. 3, pp. 240–252; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 162–166*).—Previously noted from another source (E. S. R., 21, p. 184).

Leucocytozoon piroplasmoides of epizootic lymphangitis of the horse, A. Thiroux and A. Teppaz (*Compt. Rend. Acad. Sci. [Paris], 147 (1908), No. 22, pp. 1075, 1076*).—The authors briefly review the literature on the etiology of this disease, and report studies in a horse that had been treated for and cured of trypanosomiasis by the use of orpiment and atoxyl. They found the morphology and parasitic habits of the protozoa present in the sores to be much similar to those of *Helcosoma tropicum*, and regard the disease as the equine variety of the oriental sore in man.

The treatment of dog distemper by means of vaccination, R. Bissauge and L. Naudin (*Rev. Gén. Méd. Vét., 12 (1908), No. 141, pp. 503–507*).—During the course of their practice the authors have experimented on numerous subjects with the various therapeutic agents. They conclude that none of these has any prophylactic value. The Swiss yeast of Pury has given successful results in many cases, particularly with dogs in which the nervous symptom arose at the beginning. The antistreptococcic serum of the Pasteur Institute and that of Dassonville and Wissocq have given equally encouraging results. In their practice the authors have given preference to the latter serum, which they now use in a systematic way. In order to utilize the therapeutic power of this serum and obtain the best results from its use applications must be made at the onset of the disease, before lesions have formed.

The successful drug treatment of canine piroplasmosis, together with observations upon the effect of drugs on Piroplasma canis, G. H. F. Nuttall and S. Hadwen (*Parasitology, 2 (1909), No. 1–2, pp. 156–191, fig. 1*).—The authors' conclusions follow:

"We have discovered that trypanblau and trypanrot are highly efficient remedies in the treatment of canine piroplasmosis, no drug or mode of treatment having hitherto been found to exert any appreciable effect upon this very fatal disease. The drugs exert a direct and observable effect upon the parasites (a) by causing the pyriform parasites to quickly disappear, and (b) in most cases, by causing the total disappearance of the parasites from microscopic observation in the peripheral blood. The disappearance of the parasites from the blood is usually temporary, the parasites reappearing in small numbers after an interval of 9 to 12 days, but the dogs, as a rule, show no symptoms and gradually progress toward recovery. In our experience there is but slight loss of weight in treated animals, this being in marked contrast to what is usually observed in dogs which recover naturally. In the 2 dogs which died of a relapse the parasites reappeared after an interval of 4 to 5 days. . . . Arsacetin and soamin exert no curative effect upon canine piroplasmosis."

On the supposed development of Trypanosoma lewisi in lice and fleas, and the occurrence of Crithidia ctenophthalmi in fleas, C. Strickland (*Parasitology, 2 (1909), Nos. 1–2, pp. 81–90*).—The alimentary tracts of 104 lice (*Hæmatopinus spinulosus*), which had been taken from rats infected with *T. lewisi*, were examined. In 51 lice no trace of *T. lewisi* could be found, but in 53 lice *T. lewisi*, unchanged in every particular, was found in various parts of the gut. The trypanosome was seen to be quite unchanged in stained preparations.

The alimentary tracts of 45 fleas (*Ctenophthalmus agyrtes*) which had fed on infected rats were also examined, but in 43 fleas *T. lewisi* could not be found. They disappeared very rapidly from the ingested blood and could not be found in stained preparations. In 2 fleas trypanosomes were found, but they did not differ

in form from those seen in the blood of the rat. *Crithidia ctenophthalmi* was found in 9 of the fleas.

About 370 lice and 75 fleas were examined, but no evidence was obtained of developmental changes of *T. lewisi* in either fleas or lice.

Fatal enteritis in a tiger caused by Physaloptera præputialis, A. J. HARRISON and I. W. HALL (*Parasitology, 2 (1909), Nos. 1–2, pp. 29–31*).—A widespread distribution of the nematode and the extensive chronic irritation of the gastric and intestinal wall are said to have been quite sufficient to account for the death of the animal.

RURAL ENGINEERING.

The best road and the right way to make it, A. L. BARBER (*New York, 1909, pp. 32, dgms. 4*).—This pamphlet contains a brief account of early road builders and their attempts to secure ideal pavements for both country roads and city streets. The author sums up the requirements of both types of roads and discusses the merits of asphalt for city streets and of macadam for country roads, as well as road preservation and dust preventives.

The chief object of the pamphlet is to present a new type of country road, which it is believed will best meet requirements. This is a combination of asphalt and macadam, with an asphalt strip of suitable width running through, and usually in the middle, of the macadam. It is estimated that this would cost but 30 per cent more than the macadam alone, and would last 15 to 20 years longer.

Waterproofing concrete with asphalt (*Cement and Engin. News, 21 (1909), No. 4, pp. 117–119, figs. 3*).—Methods of waterproofing concrete structures are described.

Between 2 layers of concrete, previously painted, a commercial asphalt is applied with mops at a temperature of about 425° F. Even should cracks occur in the concrete, the elasticity of the asphalt layer will secure the structure against leakage. When water pressure has to be contended with, the method advised is to use saturated felt covered with hot asphalt, and there is described and illustrated the construction of a water-tight reservoir, using this method.

Wells in the Gangetic alluvium, W. H. MORELAND (*Agr. Jour. India, 4 (1909), No. 1, pp. 34–42, figs. 2*).—Irrigation in the United Provinces of India depends largely on wells for its supply of water, and the author states that while the resources of the rivers available for canals are almost exhausted, the possibilities of increasing the number of wells is unlimited. In the wells dug in the alluvium bordering the Ganges River conditions are such that if water is lifted faster than at a given rate the influx of sand fills the well, rendering it useless. The author describes methods in use to increase the capacity of wells by so driving pipe from the bottom of the uppermost water-bearing stratum through strata of clay as to penetrate a lower water-bearing sand. Even then care has to be exercised not to overtax the well. This accounts for the small number of power pumps used in the region.

Utilizing farm water power, R. M. WINANS (*Farm and Fireside, 32 (1909), No. 17, pp. 1, 5, figs. 3*).—There is given a popular discussion of methods of estimating and utilizing the power available from small water courses. A number of practical suggestions regarding construction and operation are made with a view to enable farmers to obtain light and power from near-by streams.

Farm hydro-electric plant without operating attendant, P. J. O'GARA (*Elect. World, 53 (1909), No. 23, pp. 1374–1376, figs. 7*).—This is an illustrated account of the development of the water power of a small stream and its application to lighting and operating machinery. The hydraulic and electrical equipment are described in detail as well as the various applications to which

the electricity is put. The water wheel used is a 2-ft. Pelton of special design, and works under an effective head of 75 ft., while the static head is 80 ft. The total cost of erecting the plant, including fixtures, etc., was $1,500, and it is estimated that the value of the power derived is about $700 a year.

Transportable electric motors, TROTT (*Maschinen Ztg., 6 (1908), No. 21, pp. 247, 248, figs. 4*).—There is noted and illustrated a new electric motor suitable for general power use on the farm. It is from 3 to 5 horsepower and constructed with special reference to easy transportation. It may be operated on either direct or alternating current and also on single-phase current.

[Test of an oil traction motor] (*Impl. and Mach. Rev., 34 (1908), No. 404, pp. 967, 968, figs. 2*).—There is described and illustrated a motor, operating on paraffin, which was awarded the highest prize at a plowing match of the Boston (Eng.) Agricultural Society. The results of the operation of the motor when drawing a plow and also when operating a threshing machine are given.

Reports on agricultural machinery (*Jahrb. Deut. Landw. Gesell., 23 (1908), No. 3, pp. 566–590, figs. 27*).—Under the head of fodder-making machines there is described a new straw-cutting machine of large capacity, which may be run separately or in connection with the steam thresher. Attached to the blades is a wing device which lifts the cut straw and at the same time blows it out of the machine. The wings extend beyond the knife edges and are so adjusted that the knives have a clear, unobstructed space.

Under the head of new agricultural devices there are briefly described and illustrated the following: Friction hoist for power machines; ridge drill with various changing gears; water and plunger pump; earth anchor for holding fence posts, etc.; cylindrical harrow; band for tying sheaths; potato-sorting machine; turnip-grinding machine; feeding lattice with cattle rings; beef smokehouse; transportable smoke-oven; gas producer plant adapted to private houses and small farms using from 5 to 30 lights; harvester with attachment for raising the grain to the binder; and disengaging apparatus for harrows.

Miscellaneous implements exhibited at Newcastle, 1908 (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 182–188*).—A large number of implements were exhibited at the 1908 show of the Royal Agricultural Society of England, these including gristmills, oil motors, traction engines, pumps, cream separators, etc.

A silver medal was awarded to a lamp pump first exhibited in 1907 and subsequently improved. This pump is of the pulsometer type, and for heads of less than 50 ft. is operated on a vacuum produced by condensing steam at atmospheric pressure. For higher heads the steam is supplied at a higher pressure. The steam is generated in a small boiler heated by an ordinary paraffin lamp. The improvements included a new condenser arrangement which enables the pump to prime itself and to work more efficiently on a long suction, and a method of insuring a proper action of the water cushion at the bottom of the pump.

An effective lime spreader, F. E. LEE (*Jour. Dept. Agr. Victoria, 6 (1908), No. 9, pp. 528, 529, figs. 2*).—This article describes a machine of simple construction which can be drawn by one horse. The axle is geared to a shaft carrying 22 cog wheels, operating small square-linked iron pulley chains 6 in. apart, which pass through the box containing the powdered lime. As the machine moves forward the lime is drawn out by the links and is claimed to be uniformly distributed on the land.

A combined tractor irrigating machine (*Engineer [London], 107 (1909), No. 2788, p. 590, fig. 1*).—There is here given a brief description of a traction machine operated on petrol and provided with a turbine pump carried on an extension of the frame at the rear. This combination is intended especially to serve the needs of sugar planters, as it can be taken to any part of the field

and be used to throw a stream of water over the tops or the plants in dry weather. The machine is also provided with a hoisting drum, which can be used for hauling plows or similar work.

A new cane-cutting machine (*Queensland Agr. Jour., 21 (1908), No. 6, pp. 305, 306*).—This article consists of a brief description of a recently invented machine for cutting sugar cane.

A simplified form of dynamometer, E. Gieseler (*Deut. Landw. Presse, 36 (1909), No. 36, p. 392, figs. 4*).—A dynamometer for measuring the draft of agricultural implements is illustrated and described.

Rat-proof granary and crib, A. A. Houghton (*Amer. Agr., 83 (1909), No. 15, p. 473, figs. 2*).—Plans and an illustration are presented of a rat-proof granary and crib made of concrete throughout.

RURAL ECONOMICS.

A congress for the discussion of rural depopulation, J. Méline (*Jour. Agr. Prat., n. ser., 17 (1909), No. 24, pp. 748–752*).—This is a paper presented by the author at the opening meeting of the congress held June 3, 1909.

The most striking features of rural depopulation in France are shown to be the reduction in the number of landowning day laborers, which in 30 years had diminished from 1,134,000 to 589,000, and in the number of small village merchants and tradesmen. These classes of rural population had crowded into the larger towns and cities and the results were an increase of tuberculosis, drunkenness, and a diminution in the vigor of the French people. The causes of rural depopulation had been the poor returns which farmers were able to procure from the land, the inability to secure farm help, and the indifference of capitalists to investing money in rural districts.

In the author's opinion the main remedies for the improvement of rural conditions lie (1) in the rehabilitation of the French educational system which, beginning with the most elementary grades and continuing through the higher institutions of learning, should be established on a firm agricultural basis for the purpose of inculcating in coming generations a liking for rural life and pursuits; (2) the interesting and educating of women for farm life; and (3) the making of rural life more attractive by the introduction of some of the features of town life.

The homestead law in France, H. L. Rudloff (*Fühling's Landw. Ztg., 58 (1909), No. 2, pp. 414–418*).—This article presents and discusses the text of the law of February 4, 1909, relating to the encumbrance, inheritance, and disposition of small holdings in France. By the terms of the law the owner is limited in his power of encumbering his property by indebtedness, can not dispose of it without the consent of his wife and heirs, and can not divide the property. The law is regarded as beneficial by keeping the small holdings intact for the protection and support of the peasant and his family and by its encouraging the rural population to remain on the land.

The future of large and small holdings, F. Caquet and E. Vandervelde (*Auto. Agr. [Paris], 3 (1909), No. 19, pp. 7–9*).—These are two articles summarizing and discussing the present status of large and small holdings in France, with particular reference to the economic operation of the small farm and the tendency, by the creation of large estates, to thrust the small holder into the ranks of the proletarians. The papers were elicited by an address delivered by J. Ruau, minister of agriculture, previously noted (E. S. R., 21, p. 189).

Associations for the creation of small holdings (*Bd. Agr. and Fisheries [London], Leaflet 218, pp. 3*).—This leaflet sets forth and discusses the regulations

adopted by the Board of Agriculture and Fisheries for the guidance of associations which have among their objects the establishing or promoting of small holdings and allotments in England and Wales. The advantages of letting to an association rather than to individuals are that the board is to a great extent relieved of the responsibility of managing the land and securing tenants, while the associations would increase thereby their sphere of usefulness and would be able to offer their tenants and members the advantages of cooperative methods of doing business.

Concerning the farm labor problem, E. LAUR (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 28, pp. 443, 444*).—This is a discussion of the provisions of the new law in Switzerland which bear on the question of farm life.

The force of the provisions discussed relates to the retention of farms in the hands of the children who have been trained in agricultural pursuits and of the rights of children on coming of age to receive compensation for services rendered on the farm during their minority. Thus a son or daughter who has been educated by parents or older children is entitled in case of a settlement of an estate to a lesser share than those who have remained at work on the farm. These features of the law are believed to offer a prospect for keeping the youth on the land and the families of Swiss peasants more intact than under the old régime.

The insurance of farm laborers against accidents at their work, A. BRUTTINI ET AL. (*Bol. Quind. Soc. Agr. Ital., 14 (1909), Nos. 12, pp. 666–680; 13, pp. 705–710*).—These articles set forth the present status of insurance among farmers and farm laborers against natural forces and accidents, with the rules and by-laws of the mutual society of Vercelli as typical of the organization and operation of such associations in Italy and other countries. An outline of the status, purposes, and work of several such organizations is presented, the information exemplifying the different kinds of insurance for farm laborers against accidents that are carried on in Italy and other countries.

The insurance of farm laborers against accidents at their work, I. BANDINI (*Atti R. Accad. Econ. Agr. Georg. Firenze, 5. ser., 6 (1909), No. 2, pp. 219–223; Bol. Quind. Soc. Agr. Ital., 14 (1909), No. 14, pp. 746–750*).—The author points out many defects in the present forms of insurance against accident among farm laborers in Italy (see preceding article), as well as in the scheme proposed by A. Conti, and suggests the formation of a bank of insurance in each province, which shall be under the direct control of provincial officials. One of the chief defects of the Italian insurance laws, in the author's opinion, is their uniformity of application throughout Italy and to all classes of farm laborers. A better plan is thought to be to give authority to provincial banks of insurance to fix the rates, etc., according to the conditions prevailing in each province and the different classes of farm help, as laborers, share tenants, small owners, etc. In other words, a scheme of insurance for the agricultural classes is proposed which is marked by its great flexibility and adaptability to all conditions and all provinces in Italy.

Concerning the obligatory insurance of farm laborers against accidents at their work, P. CAPELLANI (*Bol. Quind. Soc. Agr. Ital., 14 (1909), Nos. 15, pp. 766–771; 16, pp. 798–807*). The author discusses the proposed law of A. Conti (see above), the application and limitations of present laws relating to accident insurance in Italy, Germany, Denmark, England, and Belgium, raises serious objections to a law limited to agriculture and kindred industries, and favors a general law applicable to all classes of wage-earners.

Cooperation in the marketing of agricultural produce, J. L. COULTER, J. B. MORMAN, and T. N. CARVER (*Amer. Econ. Assoc. Quart., 3. ser., 10 (1909), No. 1, pp. 258–274*).—These are papers and discussions presented at the annual meet

ing of the American Economic Association held at Atlantic City, N. J., December 28–31, 1908.

The nature and importance of agricultural produce are emphasized in their relation to social welfare, and the necessity of improving the economies in the production, manufacture, grading, packing, and transportation of such goods is discussed, together with the economic limitations of the cooperative movement in the marketing of agricultural produce as regards (1) the improvement in the quality of the products; (2) the elimination of the middleman; and (3) the benefits to consumers.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 8, pp. 49–56*).—Statistics on the condition, value, and prices of principal crops in the United States and notes on foreign crop conditions are reported.

AGRICULTURAL EDUCATION.

The farmers' institute with relation to agricultural high schools, F. L. Stevens (*U. S. Dept. Agr., Office Expt. Stas. Bul. 213, pp. 53–57*).—The author treats the subject under two main heads, (1) the duty of the agricultural high school to the individual pupil, and (2) its duty to the community as a whole.

He holds that under the first requirement the school should surround the pupil with an agricultural atmosphere, and that agriculture must be the dominating thought of such a school, standing out "as clearly as theology in a school for the ministry, law in the law school, or medicine in the medical college." He believes that the desired results can not be secured in a "dual purpose" high school unless large funds are available to provide elective courses.

Under the second head he summarizes the benefits of the agricutural school to its community as follows: Demonstration farming, with the overseer (teacher) present at least 9 months in the year; the publication of bulletins of local interest; monthly institutes; continuous systematic aid to neighboring teachers in rural schools; testing of seeds, butter fat, fungicides, insecticides, fertilizers, and new tools; training of future teachers for the rural schools, and the general awakening of the people to the possibilities of larger success in agricultural work.

The author sums up his recommendations as the following: "A dominant agricultural atmosphere to ennoble and dignify agriculture, to make the pupil realize that agriculture is worth the while; a proper recognition of agriculture in our text-books of history, arithmetic, geography, literature, science; a school curriculum broad enough to give culture, but special enough to bear upon the lives of the pupils and adapted to the majority, not to the minority, of the graduates; a competent teacher secured by whatever salary is necessary; a cooperation between the agricultural high school and the agricultural colleges and the normal schools of the State."

School agriculture in its relation to the community, F. W. Howe (*Rural Life Conference, 1909. Charlottesville, Va., 1909, pp. 66–71*).—Specific suggestions are given for connecting agriculture, as taught in public high schools having a special teacher of agriculture, with the various agricultural activities of the community.

The agricultural revolution, and the teacher's part in it, C. H. Poe (*Rural Life Conference, 1909. Charlottesville, Va., 1909, pp. 72–83*).—A review of the development of agriculture, an appeal for teaching the principles of agriculture in the public schools, and an argument to show that women can teach agriculture.

Practical agriculture in rural schools, F. B. Jenks (*Jour. Ed. [Boston], 70 (1909), No. 4, pp. 93, 94*).—A review is given of the progress in introducing

agriculture into the public schools of Massachusetts, with a description of the experiments in agricultural education at the North Adams State Normal School where 3 training schools are maintained, a city school with all the grades, a mill village school with 2 rooms and 8 grades, and a rural school with 2 rooms and 6 grades. Particular emphasis is laid upon the methods of conducting school and home gardens in connection with these training schools.

Agricultural and industrial education for Oklahoma schools, E. E. BALCOMB (*Bul. Okla. Agr. and Mech. Col., 7 (1909), No. 1, pp. 41, figs. 16*).—General suggestions are made for organizing different phases of agricultural education under the law prescribing such instruction in the public schools of Oklahoma.

Traveling schools, A. H. SNYDER (*Rural Life Conference, 1909. Charlottesville, Va., 1909, pp. 48–54*).—In this paper a description is given of the organization and work of the winter short courses held at different points in Iowa by the extension department of the Iowa College.

Extension work in the West, A. H. SNYDER (*Rural Life Conference, 1909. Charlottesville, Va., 1909, pp. 24–31*).—The author defines the purposes of extension work and describes the different features of extension work in Iowa for the instruction of rural children and adults.

Public school extension work, O. B. MARTIN (*Rural Life Conference, 1909. Charlottesville, Va., 1909, pp. 32–42*).—The purposes and possibilities of public school extension work are set forth, and the work of the author in connection with the farmers' cooperative demonstration work of this Department in organizing boys' and girls' agricultural clubs in the South is described.

Boys' and girls' agricultural clubs, F. W. HOWE (*Rural Life Conference, 1909. Charlottesville, Va., 1909, pp. 43–47*).—A brief description of the origin and development of the boys' and girls' agricultural club movement is given.

Corn, cotton and live stock contests for Georgia schools and school children—1909 (*Bul. Univ. Georgia, No. 98, pp. 32, figs. 9*).—This bulletin contains the rules governing the corn, cotton and live stock contests for Georgia school children, suggestions to the contestants to aid them in planning the work, score cards for corn and cotton and for bacon and fat hogs, a record blank for corn and cotton, directions for judging cotton and poultry, and notes on variety tests of cotton.

Farmers' institutes in Georgia (*Bul. Univ. Georgia, No. 102, pp. 276, figs. 16*).—This includes the annual report of the director of farmers' institutes for 1908, an account of the exercises at the dedication of the new building of the College of Agriculture, the proceedings of the special conferences on fertilizers, forestry, crop rotation, agricultural education, corn production, horticulture, cotton growing, live stock, and women's work, and the results of corn and cotton contests in the State.

Elements of agriculture, G. F. WARREN (*New York and London, 1909, pp. XXIV+434, pls. 14, figs. 176.*)—The author has designed this text-book for use in high schools, academies, and normal schools, and in colleges where only a short time can be given to the subject. It is probably the first modern textbook of agriculture to be prepared especially for secondary schools.

The plan followed corresponds closely to the outline recommended by the Committee on Instruction in Agriculture of the Association of American Agricultural Colleges and Experiment Stations. An introductory chapter defining agriculture and giving its divisions is followed by chapters on the improvement of plants and animals, the propagation of plants, plant food, the soil, maintaining the fertility of the land, some important farm crops, enemies of farm crops, systems of cropping, feeds and feeding, horses, cattle, sheep,

swine, poultry, farm management, the farm house, and the farm community. An appendix contains 18 tables giving important information concerning apparatus and equipment for teaching agriculture in high schools, suggestions for the library, and data concerning the viability of seeds, quantity of seeds per acre, legal weights, fertilizers, feeds, value of agricultural products, average yields, agricultural production in the United States, average wages of farm labor, rules for measuring grain, hay, and land, and various statistics showing the progress of agriculture.

Guide to the study of plant culture, M. FISCHER (*Leitfaden der Pflanzenbaulehre. Stuttgart, 1907, pp. XI+232, figs. 113*).—This book is intended for practical agriculturists and for use in agricultural schools. Part 1 is devoted to general plant culture, including discussions of plant food, soil, and climate; part 2, to the culture of special crops such as the cereals, leguminous plants, forage crops, hoed crops, and a number of plants of minor agricultural importance; and part 3 takes up the question of plant breeding, discussing in this connection the breeding of a number of the more important field crops. A list of works with reference to general agriculture, plant culture, and plant breeding is also given.

Textbook on plant culture for rural public schools, A. CHRISTENSEN (*Lærebog i Planteavl for Folkeskoler paa Landet. Copenhagen, 1909, pp. 82, figs. 27*).—This text-book, issued by the Royal Danish Agricultural Society, is intended as a guide for teachers and pupils of rural public schools and evening schools.

Experimental dairy bacteriology, H. L. RUSSELL and E. G. HASTINGS (*Boston, New York, Chicago, and London, 1909, pp. VIII+147, figs. 19*).—This is a handbook of dairy bacteriology intended to train the student in the bacteriological processes necessary for him to comprehend the relations, use, and care of micro-organisms to dairy processes. Specific information is given concerning the glassware and other equipment of the bacteriological laboratory, the preparation and care of the different media, the making and study of cultures, the use of the microscope, and the relations of bacteria to milk and milk products.

Preventing damage by frost, J. W. SMITH (*Agr. Col. Ext. Bul. [Ohio State Univ.], 4 (1909), No. 9, pp. 9–12, figs. 2*).—Conditions favorable for frost formation and methods of protection against frost are set forth by the author.

Selecting seed corn, L. A. MOORHOUSE (*Bul. Okla. Agr. and Mech. Col., 7 (1909), No. 2, pp. 23, figs. 14*).—Directions are given for selecting and testing seed corn by school children, together with a score card for corn, directions for testing other seeds, and statistics of the corn crop of Oklahoma.

The sport of bird study, H. K. JOB (*New York, 1908, pp. XIII+284+IV, pls. 76*).—A popular account, richly illustrated with original photographs.

A loaf of bread, RUTH A. WARDELL (*Agr. Col. Ext. Bul. [Ohio State Univ.], 4 (1909), No. 10, pp. 4–10, figs. 5*).—A discussion of the ingredients of bread and a description of the long and short methods of baking bread.

Something about sewing for Nebraska girls (*Lincoln, Nebr.: Dept. Pub. Instr., 1909, pp. 11, figs. 5*).—This publication was prepared for members of the Nebraska Girls' Domestic Science Association and for teachers who are interested in the work. It contains a list of the articles to be prepared for the State sewing contest for which premiums are to be awarded, information concerning a short course in cooking and sewing offered by the Nebraska School of Agriculture at the State meeting of the Girls' Domestic Science Association, directions for making aprons and shirt waists, a recipe for bread, and a score card for bread.

MISCELLANEOUS.

Nineteenth Annual Report of North Dakota Station (*North Dakota Sta. Rpt. 1908, pt. 1, pp. 59*).—This contains the organization list, a brief report by the director, departmental reports, of which portions of that of the chemist and of that of the botanist are noted on pages 414, 415, and 436 of this issue, and a financial statement for the fiscal year ended June 30, 1908.

Annual Report of Virginia Station, 1908 (*Virginia Sta. Rpt. 1908, pp. 150*).—This contains the organization list, a report of the director discussing the finances, work, publications, and changes in personnel of the station, a financial statement for the fiscal year ended June 30, 1908, departmental reports, the experimental work which is noted elsewhere in this issue, and numerous special articles abstracted elsewhere in this issue.

Report of the Bureau of Agriculture for the fiscal year ending June 30, 1908, G. E. Nesom (*Philippine Agr. Rev. [English Ed.], 2 (1909), No. 1, pp. 3–67, pls. 7*).—An account of the work and publications of the Philippine Board of Agriculture for the fiscal year ended June 30, 1908.

Report on the work of the Imperial Institute 1906 and 1907, W. R. Dunstan (*Colon. Rpts., Ann. [Gt. Brit.], No. 584, pp. 76*).—In this report brief notes are given on the results of the tests under way of cotton, fiber plants, rubber, timber, oils and oil seeds, coffee, tea, coco, and other foodstuffs, tanning materials, dyestuffs, resins, gums, drugs, poisonous plants, animal products, and miscellaneous materials.

Development of agricultural experimentation by the Imperial Free Economic Society (*Zap. Novo-Aleksandri. Inst. Selsk. Khoz. i Lycsov., 19 (1908), No. 3, pp. 123–150*).—The development of agricultural experimentation by the Imperial Free Economic Society, under the direction of D. I. Mendelyeeva, is traced from the time of the first experiments.

The report of the National Conservation Commission and a chronological history of the conservation movement (*Nat. Conserv. Com. Bul. 4, pp. 52*).—This contains the report of the National Conservation Commission, a supplementary report by the Joint Conservation Conference, a report of the North American Conservation Conference, the text of the invitation issued for a world conservation conference, and a summary of data as to the progress and development of the conservation movement.

Encyclopedia of Agriculture (*Edinburgh and London, 1909, vol. 4, pp. 638, pls. 37*).—This is the fourth volume of the general encyclopedia of agriculture. It contains a calendar of farm operations, tables of weights and measures, analyses of feeding stuffs and fertilizers, and other useful data, the text of the more important statutes, orders, etc., relating to agriculture, colored anatomical plates of domestic animals, and an index to the entire encyclopedia.

Accessions to the Department Library, January–March, 1909 (*U. S. Dept. Agr., Library Bul. 71, pp. 81*).

NOTES.

Connecticut College and Station.—The total state appropriations for the ensuing biennium aggregate $112,101. Of this $50,000 is for current expenses, $4,000 for the station, $18,000 for four new cottages, $12,500 for a dining hall, $10,000 for the improvement of the road from the college to the railroad station, $8,500 for the purchase of an additional farm, $5,000 for the equipment of the horticultural hall, and the remainder for installing a windmill, watertank, etc.

The most largely attended poultry meeting ever held in the State took place at the college July 27 and 28, under the auspices of the State Poultry Association, six States being represented.

Delaware College and Station.—Charles L. Penny, formerly chemist of the station, has resigned as professor of agricultural chemistry at the Pennsylvania College to return to this institution as professor of chemistry, succeeding Dr. Theodore R. Wolf, deceased. Under a rearrangement of duties, C. O. Houghton, entomologist, has been transferred entirely to college work and Dr. M. T. Cook, professor of botany, and Firman Thompson, professor of agricultural chemistry, have been assigned exclusively to station work. H. D. Eggers, a graduate of the University of Pennsylvania, has been appointed assistant chemist in the station, and Jacob Taubenhaus, a graduate of Cornell University, assistant plant pathologist.

Idaho University and Station.—John F. Nicholson, formerly botanist and entomologist at the Oklahoma College and Station, has been appointed bacteriologist, and has entered upon his duties.

Kansas College and Station.—Wilmar E. Davis, of the University of Chicago, has been appointed assistant professor of botany in the college and assistant botanist in the station. Other appointments in the station include Dean H. Rose, Paul W. Graff, and Miss Anna Monroe as assistants in botany. O. A. Stevens has resigned as assistant in botany to accept a position as assistant in charge of the newly established seed-inspection laboratory at the North Dakota Station.

Maine University and Station.—Recent additions to the university staff include G. E. Simmons as professor of agricultural extension, M. E. Sherwin as assistant professor of agronomy, W. R. Palmer as instructor in horticulture, J. R. Dice as instructor in animal husbandry, and Laura Comstock as assistant professor of domestic science. J. E. McClintock, professor of agricultural extension work, has resigned to accept a position with the United States Bureau of Education, as specialist in land-grant college statistics.

The station farm for investigations in orcharding and field crops, the purchase of which was authorized by the last legislature, has been selected. The farm is located at Monmouth, is equipped with modern buildings, and contains 225 acres, of which 100 acres are well adapted to tillage and 60 acres are already set to orchards.

Maryland Station.—C. W. Nash, assistant agronomist, resigned September 1 to accept a similar position at the Kansas Station. R. H. Ruffner, assistant

veterinarian, resigned July 15, to take charge of the dairy herd at one of the hospitals of the Isthmian Canal Commission.

Michigan Station.—Charles S. Robinson, a graduate of the University of Michigan, has been appointed research chemist, vice Dr. S. L. Jodidi, who has accepted a similar position in the department of soils at the Iowa Station. Charles B. Collingwood, assistant chemist, has resigned to accept an appointment as circuit judge of Ingham County, Michigan.

Minnesota University and Station.—W. M. Liggett, who retired as dean and director in 1907 on account of failing health, died August 29, at his home in St. Anthony Park. Colonel Liggett was born in 1846 in Union County, Ohio, but removed in 1884 to Minnesota, where his activity in promoting the introduction of better farming methods led to his appointment in 1888 to the chairmanship of the agricultural committee of the university board of regents. Continuing in this capacity for more than seventeen years, he took a prominent part in the organization and development of the college and school of agriculture and of the station. From 1893 to 1896, when the station was without a director, he served as chairman of the station corps. In the latter year he was formally appointed dean and director, and occupied this position until his retirement. He was also secretary of the State Agricultural Society for a time, was a veteran of the civil war, and had held numerous state and county offices.

A two-year course has been organized for men who expect to teach or to supervise work in industrial subjects. The course is open to college or normal school graduates, or to those whose experience in teaching or in supervision has given an equivalent training. The first year will be taken in the school of agriculture and the second in the college of agriculture. With the technical work in both years will be given pedagogic studies in the management of industrial schools and courses, and some practice teaching.

The university and station recently cooperated with this Department in exhibits and demonstrations at the state fair. A special feature were the lectures, these being illustrated by moving pictures.

Minnesota Farm Review notes the appointment of Dillon P. Tierney as instructor in forestry, beginning January 1, 1910, and of Rodney M. West as instructor in chemistry in the school of agriculture and assistant in agricultural chemistry in the station. L. B. Bassett has resigned as assistant agriculturist and farm superintendent to engage in commercial work.

New Hampshire College and Station.—J. F. Eastman has resigned as assistant in agronomy and assistant agriculturist to accept a fellowship in agronomy at the University of Illinois.

North Carolina College and Station.—Recent appointments include the following: B. J. Ray, Ph. D., as assistant professor of chemistry and assistant chemist, vice W. A. Syme, resigned to become oil chemist for the North Carolina State Department of Agriculture; F. W. Sherwood as assistant chemist, vice J. K. Plummer, resigned to take up graduate work at Cornell University; and Louis R. Detjen, a 1909 graduate of the University of Wisconsin, as assistant horticulturist.

North Carolina State Station.—E. L. Worthen, of the Bureau of Soils of this Department, has been added to the staff for work in soil investigation.

Ohio University and Station.—H. L. Goll, of Stryker, has been appointed to the board of control to succeed Cary W. Montgomery. W. M. Cook and W. L. Elser have been appointed assistants in the department of cooperative experiments. R. C. Collison has been appointed assistant in nutrition, vice Dr. Adolph Lehmann, resigned. L. L. LaShell, assistant chemist, has resigned to accept a commercial position.

Pennsylvania College and Station.—Among the recent appointments are the following: W. A. Cochel, associate animal husbandman at the Purdue Station, as professor of animal husbandry; Homer Jackson as instructor in poultry husbandry in the college and poultryman in the station; Warren G. Ross, professor of agronomy at the College of Hawaii, as assistant in agronomy; and Paul B. Bennetch as assistant in dairy husbandry.

Porto Rico Station.—T. B. McClelland has been appointed assistant horticulturist.

Rhode Island College and Station.—Philip A. Money, of Slocum, has been designated as the representative of the State Board of Agriculture on the board of managers. In the college, C. B. Coleman, assistant in dairy husbandry at the Illinois Station, has been appointed professor of animal husbandry, and G. R. Cobb, a graduate of the Massachusetts College, instructor in horticulture. In the station, T. S. Hammett, a graduate of Tufts College, has succeeded Dr. William Quantz as assistant chemist, and John Daniel, a graduate of the Massachusetts College, has been appointed assistant in agronomy.

The completion of the new dormitory building has made possible a remodeling of the former dormitory, the first floor being utilized for the department of biology and the college executive offices, and the remainder as a woman's dormitory.

The station now has under way over 100 cooperative experiments.

Clemson College.—D. C. Mooring has resigned as assistant professor of horticulture at the Mississippi College to accept the associate professorship of horticulture, and has entered upon his duties. Lee I. Knight has been appointed associate professor of botany and forestry.

Tennessee Station.—Sherman Leavitt, of the Bureau of Chemistry of this Department, has been appointed soil chemist.

Vermont University and Station.—Dr. L. R. Jones, for twenty years professor of botany in the university and botanist in the station, has resigned to take effect February 1, 1910, to accept the newly established position of plant pathologist at the Wisconsin University and Station. A. P. Bigelow, assistant in dairying in the station, has resigned to engage in commercial work, and P. A. Benedict, a graduate of the University of Rochester, has been appointed assistant chemist. Stanley Hargreaves has been appointed station gardener, vice H. V. F. DeThestrup, and E. H. Powell, treasurer of the station for seventeen years, has been succeeded by C. P. Smith.

A summer school, in which among other subjects agriculture and domestic science were taught, was held for four weeks in July and August.

Washington Station.—At the annual meeting of the board of regents, the experimental and extension work was reorganized with a view to further differentiation. The director of the station was made superintendent of farmers' institutes and extension work, O. M. Olson deputy superintendent of farmers' institutes, and H. W. Sparks supervisor of demonstration farms. In addition to changes in the staff already noted, W. T. McDonald was promoted from assistant animal husbandman to animal husbandman, and Dr. H. B. Humphrey from assistant botanist to plant pathologist. E. L. Peterson, a graduate of the University of Minnesota, was appointed assistant soil physicist. E. J. Kraus, whose selection as assistant entomologist has been noted, has declined the appointment and accepted a position as assistant horitculturist at the Oregon Station.

Wisconsin University and Station.—The recently established fellowships in agriculture have been awarded to Alvin C. Oosterhuis in animal husbandry, and Morris W. Richards in horticulture, both the recipients being 1909 graduates of the college of agriculture. The scholarships provided were awarded to Miss

Alice Catherine Evans, a graduate of Cornell University, for work in bacteriology, and to Charles P. Haslam, a graduate of the Kansas College, in chemistry.

Under an appropriation from the last legislature poultry courses are to be provided, and a poultry department is being organized with James G. Halpin, assistant professor of poultry husbandry at the Michigan College, at its head. E. P. Sandsten has resigned as horticulturist to engage in commercial work in Montana. Emil Truog and W. E. Morris, 1909 graduates of the college of agriculture, have been appointed respectively assistant in soils and assistant in the State fertilizer and feed inspection, the latter position being in succession to George S. Hine, resigned to become principal of the Marinette County (Wis.) School of Agriculture. John L. Tormey has been appointed assistant animal husbandman in the station.

Experiments with various methods of removing stumps from cut-over lands are under way, in cooperation with the Minnesota Station and the Farm Management Investigations of this Department.

Wyoming Station.—A horse barn to cost $5,000 is being erected on the university stock farm and will contain a large room to be used for stock judging. The wing which is being added to the woman's building is well under way, and when finished will complete the domestic science equipment.

L. Charles Raiford, Ph. D. (University of Chicago), for two years associate professor of chemistry in the University of Chicago, has been appointed research chemist, and will have charge of the Adams fund work in chemistry.

Death of Miss Maria Parloa.—Miss Maria Parloa, widely known as a teacher and writer on home economics, cookery, and related topics, died August 21 at her home in Bethel, Conn. She was born in September, 1843, in Massachusetts, and after a number of years of practical training began her professional work as a lecturer on cookery and home economics in Boston in 1877. A little later she opened a school of cookery.

For some time Miss Parloa was special instructor at Lasell Seminary, gave courses in sick-room cookery to Harvard medical students, lectured before classes at the Boston Cooking School, and gave many lecture courses in various places in New England and elsewhere. Following a long residence in Europe, where she made special study of English and French methods of cookery, she opened a model school of cookery in New York, which she conducted for a number of years until she again went abroad for a long stay.

Miss Parloa was the author of a number of well-known books on cookery and home economics topics and contributed to various magazines. She was the author of two of the Farmers' Bulletins of this Department on nutrition, Canned Fruit, Preserves and Jellies, and Preparation of Vegetables for the Table. Miss Parloa was a pioneer and leader in the organized effort for advancing the home economics movement in the United States in both its educational and practical sides. Her observations on the effects of methods of cookery upon the wholesomeness of food were extended, and in this and in other ways she contributed much of value to the science of food and nutrition.

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EXPERIMENT STATION RECORD.

VOL. XXI. NOVEMBER, 1909. No. 6.

The Portland convention of the Association of American Agricultural Colleges and Experiment Stations was notable not only as the second in the history of the association to be held west of the Rocky Mountains, but also on account of the good attendance and the lively interest shown in the discussion of a number of most important subjects. The representation was an unusually wide one, delegates being present from forty-two States and Territories, as well as from Porto Rico and Canada.

The meeting furnished striking illustrations of the rapid development of agricultural education and research in the newer portions of the country, and afforded an opportunity for the presentation of certain phases of educational and research problems of special interest and importance to that region. The proceedings, however, were in no sense narrowly sectional, but included the consideration of many subjects of the broadest scope and significance.

As might have been predicted from the action of the previous convention, the extension work was a leading subject of discussion at the Portland convention. The growing importance and rapid expansion of extension work had been strongly emphasized at the Washington meeting, and there was an evident conviction in the minds of many members at that time that such work should be more definitely provided for, and organized in the association and in the institutions represented therein.

The strong and convincing report of the committee on extension work at the Portland meeting served to further develop and crystallize this feeling. Practically without opposition, the constitution of the association was amended so as to provide for a section on extension work, and following this the new section was duly organized by the election of a chairman and secretary, and instructed to prepare a programme for consideration at the next meeting of the association. Provision was thus definitely made for the full consideration of the many complicated and difficult problems involved in the organization and administration of extension work, and in its adjustment to present agencies and facilities for education and research in agriculture.

The rapid increase of various forms of agricultural extension work has brought with it many important questions in regard to its relation to the station work and staff. It has been quite clear for some time that the institutions engaging in such enterprises should as rapidly as possible provide a definite and separate organization for the work, and endeavor to obtain adequate funds other than those now provided by federal appropriation, in order that it might be maintained without encroaching upon either the station work or funds on the one hand, or upon the regular instruction work of the college on the other.

A clear differentiation of extension work from the accepted forms of station activity is not always a simple matter, and great confusion has often been produced in the public mind by the fact that special appropriations for extension work have been put under the control of the stations. This has fostered a feeling that such work is a legitimate function of the stations, and that they should retain and foster it. Under such circumstances, there is constant pressure to use the federal funds which are given to the stations for experimental work directly or indirectly for the promotion of the extension features. This takes the form of demands on the time of station officers who are paid from federal funds, the printing and franking as station bulletins or publications which are really extension documents, and various miscellaneous expenses which would not have been incurred except for the pressure for extension work.

The magnitude of the enterprise and the difficulties in the way of its proper administration were recognized in the report of the committee on extension work, and in the action of the association upon the suggestions and recommendations of the committee. The association indorsed the recommendations of the committee that (1) each land-grant college should organize a "department" or "division" or "school" of extension work, i. e., should organize the work as a definite part of the institution and clearly define extension work; and that (2) efforts should be made to secure a national appropriation for extension work by the colleges and by this Department, and to extend the franking privilege to extension publications.

While extension work is strictly educational in character and therefore should be organized as a department of the college rather than as a station enterprise, it should be so organized and conducted as to utilize to the fullest possible extent the results of station work, keeping its teaching strictly in harmony with those results and giving the widest publicity to the work of the station.

It has sometimes been felt that the extension departments if separated from the stations and organized with a distinct corps of workers would tend to separate the station workers from close touch

with the farmers, and obscure the importance and value of station work as related to the agricultural industry. This, however, need not be the case if the extension departments are properly organized and manned. The scheme of organization should include the giving of opportunities to station men to attend meetings of farmers from time to time to present the results of station work, and the giving of credit to the stations for whatever information received from them is incorporated in extension publications. The station should not in any case be deprived of the privilege of issuing popular accounts of the results of its experimental work as station publications.

The college authorities should take special pains to explain and reiterate to the public that the station is the source of new knowledge, while the extension department is an agency for disseminating information. It will doubtless take considerable time to impress this distinction on the mind of a public which is just beginning to appreciate the difference between the educational work of the college and the experimental work of the station. In the end, however, this distinction will be apparent to every intelligent person, and then the position of the stations as research institutions will be stronger and more satisfactory than at present, or than it can ever be while they are performing such miscellaneous functions as they now do in most cases.

Once relieved of compiling publications and a vast miscellaneous correspondence, the stations can devote themselves to experimental work with renewed enthusiasm, and under such circumstances it is reasonable to expect that they will have so much greater success in obtaining new knowledge that they will be able to impress themselves much more strongly on both scientific and practical men as the fountain heads of agricultural advancement. At the same time the extension departments will spread much more widely the practical results of the work of the stations and other agencies, create and satisfy a wider demand for information of immediately practical usefulness, and drive home the necessity and advantage of improved agricultural methods to the multitudes of farmers who now are indifferent or unwilling to depart from traditional routine.

Together the stations and the extension departments will supply the material for stronger courses of instruction and the incentive for enterprising young people to make a thorough study of agriculture, with the result that our agricultural colleges and schools will be flooded with students. Thus we shall have a broader and stronger American system of agricultural education and research. The time has come for differentiation of function and organization along the three great lines of experimental inquiry, interior instruction, and exterior dissemination of information. The sooner and more com-

pletely this differentiation is made the better it will be for American agricultural institutions and for American agriculture and people.

A widespread and lively interest in the development of secondary instruction in agriculture was evident from the character of the discussion of this subject in the Portland convention. The dominant note in all of this discussion was the necessity of coordinating and harmonizing agricultural instruction, as far as possible, with the present educational systems and methods of the country.

This was made evident by formal action of the convention in indorsing the view that "(1) agriculture, including horticulture and forestry, should be a regular part of public secondary education; (2) the unity of our educational system should be maintained, but there should be sufficient elasticity of curriculum to meet the various needs of our people; (3) the standard of the curriculum of secondary schools having agricultural courses should conform in a general way to those adopted for the general school system of the State; (4) the standard agricultural courses, whether in the ordinary high schools or in special schools, should not be narrowly vocational, but should aim to fit the pupils for life as progressive, broad-minded, and intelligent men and women, citizens and homemakers, as well as farmers and horticulturists."

In connection with this discussion the fact was also brought out that it is clearly the prevailing sentiment in the association that secondary work should be definitely differentiated from college work in our agricultural colleges. This involves the establishment of standard requirements for entrance to and graduation from these institutions, and the definite organization of secondary schools or courses for those students who are not qualified to enter the college. While our agricultural colleges can not at once give up all secondary instruction, they can definitely recognize it as a distinct branch of work, and by aiding in the establishment of separate secondary schools and courses can hasten the day when all secondary instruction in agriculture will be given outside the agricultural college.

On the other hand, the association by formal resolution indorsed the maintenance in every State receiving the benefits of the land-grant act of 1862 of an institution of distinctly collegiate grade in which agriculture should be a leading subject of instruction. The meaning of this action is that the friends of agricultural education believe that pedagogically agriculture should be developed in strong and broad courses of college grade in the land-grant institutions, under whatever name these may have been organized. In some States this will make it necessary for these institutions to advance entrance requirements and broaden and strengthen agricultural courses for candidates for the bachelor's degree. But whatever needs

to be done in these directions those institutions should be encouraged to do, to the end that agriculture and agricultural students may have the services of as thoroughly organized and equipped institutions of collegiate grade as are provided for any other branch of science or industry.

Agriculture is a broad and complex subject. The persons needing agricultural instruction are very numerous and diverse. A proper American system of agricultural education will include many grades and kinds of instruction and different classes of institutions. But above everything else American agriculture needs broad and strong institutions of higher education in agriculture, in which the leaders of agricultural progress may be trained. We should, then, go on as fast as possible in building and strengthening at least one agricultural college in every State and Territory, making it in every respect a genuine and thoroughgoing institution of collegiate grade. At the same time provision should be made for agricultural schools and courses to meet the needs of the masses of our agricultural people. We have the means to do all of these things, and the future welfare of our country demands that we do them promptly.

CONVENTION OF ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS, 1909.

The twenty-third annual convention of the association, held at Portland, Oreg., August 18–20, 1909, was the second in the history of the association to be held west of the Rocky Mountains, the first being at San Francisco in July, 1899. The convention was well attended, about 150 delegates and visitors being present, and an interesting programme was presented.

Meetings of the Association of Farmers' Institute Workers and of the Society for the Promotion of Agricultural Science were held just before that of the association, and the date of the convention was so timed as to permit delegates to attend also the Irrigation Congress at Spokane, Wash., and the meetings of the British Association for the Advancement of Science at Winnipeg and of the Association of Official Agricultural Chemists at Denver. The sessions of the convention were held in the parlors of the Portland Hotel and in the assembly hall of the Commercial Club of Portland, the courtesies of which were freely extended to the members of the association. Owing to the absence of President M. A. Scovell, of Kentucky, on account of illness, the general sessions were presided over by Vice-President W. J. Kerr, of Oregon.

The report of the executive committee, submitted by W. E. Stone, of Indiana, in the absence of Chairman W. O. Thompson, of Ohio, reviewed briefly the activities of the committee during the past year. Particular attention was called to the importance of more general support of the Graduate School of Agriculture. In reply to an inquiry as to whether the pension of a professor partly engaged in research work would be based on his whole salary or only on the part which he receives for teaching, President Pritchett, of the Carnegie Foundation, stated to the committee that in his judgment "the trustees of the Foundation would never make any discrimination in such cases so long as the professor concerned did a certain amount of teaching."

The committee's report also raised the question of the advisability of the association publishing its own proceedings, and a committee, consisting of E. Davenport, A. B. Storms, and E. A. Bryan, was appointed to consider this matter as well as the representation of the association before the Carnegie Foundation. This committee recom-

mended that "the representation of the interests of this body before the Carnegie Board shall rest with the executive committee itself, with the understanding that it may secure any and all assistance necessary to the adequate representation of the varied interests involved." It further recommended the publication of the proceedings in full at the expense of the association if found necessary, the proceedings to be edited and prepared for publication by the secretary.

In his report as bibliographer, A. C. True, of this Office, discussed the station library and its use. He pointed out the need in many cases of more systematic attention to the library and bibliographical work, and urged that the station should have, if possible, the services of some person trained in library and bibliographical matters who may give his time and energy quite fully to the special requirements of the station along these lines. In addition to the collection, safeguarding, filing, and general care of the documents and publications bearing on the work of the stations, "the station investigations may be greatly aided and promoted by having some person who can assist in looking up references, in making excerpts, and in making and taking care of indexes and doing bibliographical work of a miscellaneous character. . . . To cover this work the stations do not need a librarian simply, in the ordinary acceptation of the term, but rather what may be called a bibliographical aid, some one who has some scientific knowledge and who is properly trained so as to give efficient aid in bibliographical matters to the station staff."

The report of the committee on graduate study, presented by Howard Edwards, of Rhode Island, reported progress in the organization of the next Graduate School of Agriculture, which is to be held at Iowa State College at Ames, with A. C. True of this Office as dean. A plea was made for more general subscription for the support of the school.

The report of the committee on instruction in agriculture, presented by A. C. True, briefly referred to a proposed outline of courses in animal husbandry and dairying. Dr. True also presented a brief report for the committee on history of agricultural education, embodying certain data regarding the early development of agricultural education in Illinois, Michigan, New York, and South Carolina.

The following resolution, originating in the college section, was adopted by the association: "That it is the sense of this association that the national laws which constitute the charter of the land-grant colleges distinctly prescribe work of collegiate grade in agriculture and the mechanic arts, including engineering in all its branches, and the sciences related to the industries, irrespective of whether the colleges are established separately or as parts of universities."

An interesting discussion of the important subject of agricultural education in secondary schools was opened by Dr. True, in a paper in which he reviewed the present status of the subject, classified the institutions giving secondary instruction in agriculture, and suggested ways in which such instruction could be developed in harmony with the present educational systems of the country. He summed up his views of what he considered perhaps ideal conditions as follows:

"Agriculture, including horticulture and forestry, should be a regular part of public secondary education; second, the unity of our educational system should be maintained, but there should be sufficient elasticity of curriculum to meet the various needs of our people; third, the standard of the curriculum of secondary schools having agricultural courses should conform in a general way to those adopted for the general school system of the State; fourth, the standard agricultural courses, whether in the ordinary high schools or in special schools, should not be narrowly vocational, but should aim to fit the pupils for life as progressive, broad-minded, and intelligent men and women, citizens and homemakers, as well as farmers and horticulturists."

Some disapproval of separate and distinct agricultural high schools was expressed in the general discussion which followed, but there seemed to be quite general agreement that in any case the agricultural instruction should be carefully coordinated with the existing educational systems. L. H. Bailey, of New York, thought that in the discussion of this subject a clear distinction should be made between what is strictly secondary instruction and what is merely special training. The importance of separate agricultural high schools as finishing or vocational schools, and as a means of training teachers of agriculture for the elementary schools, was also brought out in the course of the discussion. The general views expressed in Dr. True's paper were indorsed by formal vote of the convention, and the advance publication of the paper was requested.[a]

An address was delivered by L. H. Bailey, of New York, on The Better Preparation of Men for College and Station Work. The subject was discussed from the fourfold standpoint of the necessity of (1) developing a spirit of scientific inquiry, (2) letting one's work propagate itself, (3) developing an incentive of self-help in one's constituency, and (4) insisting on a certain kind of preparation in the college. The necessity for a broad educational foundation was emphasized with special force, and too early or narrow specialization was strongly deprecated. The need of greater facilities than are now available for the broad and thorough post-graduate training of

[a] U. S. Dept. Agr., Office Expt. Stas. Circ. 91.

specialists was pointed out. The attitude of the investigator or instructor toward his work was considered "just as important as the work itself," and it was urged that no person can be considered prepared for college or station work who does not possess the scientific spirit. "We may well rest content that our work will propagate itself if the work is well done and enthusiastically presented." The best work for state or national constituency is that which inspires that constituency to help itself.

Professor Bailey thought that only maturer and more experienced men should be put in full charge of very responsible work, and that more time should be given to the training of persons for such work. The equivalent of a good high-school training, a regular four-year college course, and a thorough post-graduate training, leading first to a master's degree and ultimately to a doctor's degree, was considered necessary. "In order that a post-graduate degree may mean something, it is important not only that the post-graduate work itself is good, but that only those persons be allowed to candidacy who give evidence of being intelligently able to pursue the work with satisfaction."

The report of the committee on extension work, presented by K. L. Butterfield, of Massachusetts, advocated the formation of a new section of the association on extension work, a federal appropriation to the States and to the U. S. Department of Agriculture for extension work, the franking privilege for extension publications, and the organization of separate extension departments by the land-grant colleges. At a later session of the convention the recommendation with reference to amendment of the constitution to provide for a section on extension work was taken up, and after discussion was adopted by formal vote. This amendment provides for "a section on extension work composed of directors or superintendents of extension departments in the institutions in this association, or the representatives of such departments duly and specifically accredited to this section." The other recommendations of the committee were approved.

The report of the committee on station organization and policy was confined to a consideration of methods of dissemination of the results of station investigations, and dealt with the questions of improving present means of publication and of securing a common medium of publishing the results of station research work. In the opinion of the committee "every legitimate effort should be made to aid the agricultural press in presenting the station work to the people at large in a popular form. To this end abstracts of bulletins should be furnished to the press and also illustrative material by way of cuts, charts, etc." The committee also advocated greater attention to the organization of cooperative and demonstration work,

and recommended that short normal courses be held at the colleges or independent stations prior to the beginning of the farmers' institute season.

The report expressed the opinion that the bulletins should be confined to the results of research and a general description of the work, should bear the date of publication, and should be paged continuously throughout a given volume, each volume to have a table of contents, title page, and complete index, so printed that they can be easily removed and placed in proper position without cutting to single pages. Electrotyping was advocated to permit of reprints.

"All publications dealing with inspection work of whatever kind should be published under a series known as 'Official Inspections.' . . . The annual report, if merely embracing the financial statements and a brief summary of the work of the year, should be issued as a 'bulletin.' If it is of large size and is made a repository of matter of permanent value, it should have its own table of contents, title page, and index."

The committee strongly advocated the establishment of a journal of agricultural research, and outlined in considerable detail a plan for the management and maintenance of such an organ. This plan was indorsed by the association, and the matter was placed in charge of the executive committee with authority to act.

A report of the committee on affiliation of agricultural organizations was presented by H. J. Waters, chairman. The report favored affiliation, and indorsed the resolution of the Society for the Promotion of Agricultural Science inviting the affiliation of several agricultural organizations and outlining a basis for such affiliation. The proposed plan insures the full autonomy of the separate societies, but provides for a representative council, affiliated meetings just preceding those of the Association of American Agricultural Colleges and Experiment Stations, and an annual report by the council.

In a paper on The Conservation of Our Natural Resources, L. G. Carpenter, of Colorado, stated that there never had been greater reason for optimistic faith in the future than at the present time, and that utilization rather than mere conservation should be the controlling principle in dealing with the natural resources of the country. He held that even if certain resources are exhausted we have no reason to assume that future generations will not be able to meet such emergencies by providing efficient substitutes. "While we may sympathize most heartily with the objects of conservation, and especially with the attempt to restrain speculative uses, I do not think it follows that there is any necessity of a needless panic. On the other hand, there has never been a time when there is so much reason for optimistic faith in the future or in the meeting of the problems as they arise. A failure in such faith is generally due to a lack of

knowledge or of fundamental faith in a beneficent Providence, and a resultant feeling that the individual must shoulder the responsibility of thinking for the race."

At one of the evening sessions L. H. Bailey, by special request, briefly described the work of the Commission on Country Life.

Officers were chosen for the ensuing year as follows: President, W. J. Kerr, of Oregon; vice-presidents, H. J. Waters, of Kansas; W. P. Brooks, of Massachusetts; C. A. Lory, of Colorado; P. H. Rolfs, of Florida; and L. Foster, of New Mexico; secretary-treasurer, J. L. Hills, of Vermont; bibliographer, A. C. True, of Washington, D. C.

The annual vacancies in standing committees were filled as follows: Committee on instruction in agriculture, J. F. Duggar, of Alabama, and W. E. Stone, of Indiana; committee on graduate study, W. O. Thompson, of Ohio, and Brown Ayres, of Tennessee; committee on extension work, A. M. Soule, of Georgia, and E. A. Burnett, of Nebraska; committee on experiment station organization and policy, M. A. Scovell, of Kentucky, and L. G. Carpenter, of Colorado.

The following officers of sections were chosen: College section, S. Avery, of Nebraska, chairman, and W. D. Gibbs, of New Hampshire, secretary; station section, F. B. Linfield, of Montana, chairman, and H. L. Russell, of Wisconsin, secretary; section on extension work, A. M. Soule, of Georgia, chairman, and G. I. Christie, of Indiana, secretary.

SECTION ON COLLEGE WORK AND ADMINISTRATION.

The following topics were discussed in this section: (1) The Distinctive Work of the Land-Grant Colleges—Their Function, Scope, and Organization; (2) Entrance Requirements and Standards for Land-Grant Colleges; (3) Function of Land-Grant Colleges; (4) How Can the Agricultural Colleges Best Serve the Farmers in Solving Rural Problems.

The first topic was presented in a paper by A. B. Storms. He believed that the independently-established colleges were more distinctly typical of the norm contemplated in the original Morrill Law than those established in connection with State universities, and that there are good pedagogic and administrative reasons for maintaining them as separate institutions. In reference to organization he favored a strong organic unity of all the college departments, as against a degree of independence that encourages "department provincialism." The ability of men, especially of the heads of coordinate departments, to work and fit with other men without friction, was emphasized as a necessary requisite in the working compromise that must always be made between technical and administrative efficiency. The speaker deprecated the zeal for large enroll-

ments at the expense of entrance requirements sufficiently advanced to insure thorough college work, and he believed that the land-grant colleges could not consistently do less than to insist upon four years of approved high-school work as a condition of entrance.

The discussion of this paper was led by E. A. Bryan and Howard Edwards. The former emphasized the fact that the entire group of separate land-grant colleges and land-grant departments of State universities together constitute the basis of a national system of education. He believed this solidarity of interests should be fostered among the institutions represented in the association, and cautioned against a too narrow conception of the scope of education contemplated in the land-grant acts. For example, the teaching of agriculture in all productive lines is much further advanced than is the teaching of methods for distributing and marketing farm products in an economic way.

President Edwards's contribution to this discussion was mainly directed to the formulation of an answer to the question which had been asked him by the president of the Carnegie Foundation: What is the definite function of the separate agricultural colleges? He called attention to the more restrictive language of the act of 1890 as compared with that of 1862, and proposed a set of resolutions designed to express the understanding of the association on the subject of the question. See p. 507.)

President Butterfield raised a question concerning the proper place for college extension work and its director in the functions of the college. President Storms held that the head of each main department of the college should have general oversight of the instructional, research, and extension work of his department, each of these phases being more particularly in the hands of an assistant, and that the general director of the extension department should cooperate with the other department heads and their subordinate assistants in charge of extension work.

The entrance requirements and standards for land-grant colleges was presented in a paper by J. L. Snyder. He believed that entrance requirements were purely a local problem, dependent in each State upon the advancement of the secondary schools within reach of the people; but that graduation requirements should be practically uniform in all the colleges, and in keeping with traditional understandings in regard to the worth of academic degrees. The speaker particularly deprecated the tendency to alter land-grant college entrance requirements in order to meet the conditions of pension benefits on the Carnegie Foundation. "As the public educational system develops in each State, standards for college entrance will advance. They should be sufficiently high to serve as a stimulus to secondary

schools, but not so far advanced as to create a gap between the public school system and institutions of higher learning."

W. E. Stone heartily indorsed the main features of this paper, and emphasized further the view that the high schools of a State have an independent duty toward their constituencies, as finishing schools for those who do not go on to college. He believed that "the colleges should adjust their requirements to what is proper for the high schools to do."

President MacLean emphasized the necessity of frequent readjustment between the school, whether secondary or collegiate, and its constituency. The uniformity which has become almost standard throughout the country must be tempered with a variable content in the curriculum which is specially adapted to local conditions.

Under the third topic, H. J. Waters discussed the Function of Land-Grant Colleges in Promoting Collegiate and Graduate Instruction in Agriculture Outside of the Course of the Graduate School. In a rapid survey of the development of college work in recent years, he pointed out the fact that the pressure of attendance and of outside calls for information had seriously hindered the development of superior teaching and further research. "We have been giving the world the benefit of the discoveries of science for the past fifteen or twenty years; . . . but to do this alone or even chiefly is fatal to progress. The farmer will soon catch up with the college teacher, and then all opportunity for leadership is lost." The speaker held that upon the experiment station devolves the duty of "making an exact science of agriculture." Higher standards of teaching will now be required, as well as better equipment for research. He believed that the resources of the experiment station should be utilized in developing graduate work, and gave illustrations of how this had been done in his own college. The paper closed with the suggestion that the Department of Agriculture demand graduate preparation for its employees, in order effectively to encourage graduate study in the colleges.

In discussing this paper, L. H. Bailey emphasized the thought that careful discrimination must be used in determining what men should be permitted to take graduate work, so as to eliminate those who have a history of failure or inefficiency. He would allow no station workers to have any stated part in undergraduate instruction, but would use their abilities in graduate teaching germane to the lines of their own research work.

The second division of this topic, The Function of the Land-Grant College in Promoting Agricultural Education in Secondary Schools, was presented by E. A. Burnett. He maintained that the college can not escape the responsibility of directing the lines along

which progress is made. Of the two methods so far proposed for meeting the recognized demand for secondary industrial work, namely, the addition of agricultural courses in ordinary high schools, and the establishment of distinctive agricultural high schools serving an area of several counties, the first method, as so far illustrated in certain Nebraska high schools, he did not consider at all adequate to the requirements. The agricultural high school he believed likely to be deficient on the cultural side, unless it duplicates much of the literary work of the ordinary high school. To avoid this undesirable duplication, he favored the institution of strong secondary agricultural courses and equipment in connection with existing high schools favorably situated for serving a large country constituency. Where such courses are located in connection with agricultural colleges the speaker believed they should take over a considerable part of the technical agricultural work of secondary grade, thus permitting the strengthening of the purely collegiate work in agriculture; but he did not regard such schools as the proper type for isolated agricultural high schools. He believed that the distributed establishment of secondary agricultural schools would ultimately strengthen the support given to the colleges.

In discussing this paper, Dean Davenport contended that there is no need for the establishment of distinctive agricultural schools for secondary work. He described the public-school men as ready and anxious to introduce agricultural courses, in order to hold the boys who are deserting the ordinary high schools for work which appeals more strongly to their interests. He illustrated his remarks by several successful examples in his own State, and cited the case of Minnesota, with sixty-five high schools applying for the privilege of introducing an agricultural course with State aid when the law permitted only ten, as another emphatic illustration of the trend of public-school sentiment. The task now is to put vocational agriculture "within walking or riding distance" of every boy on the farm, and he believed the high schools are ready for this expansion.

E. J. Wickson presented the fourth topic of the programme, on the relation of the agricultural colleges to the solution of rural problems. It was contended that "the truth which our agriculture now most urgently needs is not to be gained by extending investigation in the physical sciences nor in the application of the results to agricultural practice, though both are desirable." Research is now needed in rural economics and sociology. Professor Wickson urged, therefore, that the agricultural colleges should broaden their research and instruction in such subjects as economics and social science, and that in universities with agricultural courses these subjects should be treated from an agricultural point of view.

Discussing this subject, J. H. Worst emphasized the importance of teaching the "hereditary farmer" ways of utilizing the developments of modern science for equipping the rural home with domestic and sanitary conveniences; and A. B. Cordley held that the best assistance that can be given the farmer is a local demonstration of the commercial success of a scientific system of farming adapted to his own conditions. Such a system must be so devised as not only to be profitable to the individual farmer, but also to conserve and increase the fertility of the soil. It can not be regarded as successful if it fails in either of these respects.

SECTION ON EXPERIMENT STATION WORK.

The topics discussed in this section were The Relation of the Station Director to the Members of His Staff, The General Problems of Irrigation and Methods of Attacking Them Experimentally, and Seepage and Drainage and Their Relation to Irrigation.

Under the first topic, E. Davenport discussed three theories of administrative policy, (1) that in which the director is the source of all authority, (2) that in which the director is nothing more nor less than a presiding officer with no authority whatever, and (3) that which aims to secure the business facility and, upon occasion, the administrative strength of the first without interfering with the personal initiative of the staff worker. The third policy of administration was approved on the ground that it makes the director to a large extent an impersonal officer and promotes the personal initiative of the worker and thus increases the efficiency of the work.

A. D. Selby, of Ohio, thought the nature of the work must determine the character of the administration. He held it to be a special duty of the director to insure timeliness and continuity of support for the work of station men. H. J. Wheeler and H. L. Russell thought it was not good administrative policy to apportion the funds too closely in advance, but that this apportionment should be left to a large extent in the hands of the director. In any case a considerable reserve should be kept for emergencies. J. L. Hills stated that he had used a budget with 10 per cent reserve based upon expenditures of two previous years. Frequent conferences with station men were advocated by E. Davenport. The need of closer supervision of the more scientific work was pointed out by H. J. Wheeler and A. C. True. H. L. Russell and L. G. Carpenter commended the project system of keeping track of the work in progress.

In connection with the proposal for a journal of agricultural science (see p. 510) C. D. Woods presented a consensus of opinion of station directors favoring the establishment of such a medium of publication.

The technical subjects on the programme, irrigation and drainage, were treated in papers by J. A. Widtsoe, of Utah, and E. L. Tannatt, of Montana. The first emphasized the fact that if principles of irrigation are well understood practical methods will be readily provided. Attention was called to the controlling influence of culture, fertility, and other factors upon the water requirements of plants. Irrigation was shown to be a powerful agent in controlling the growth and character of the plant. Finally it was pointed out that irrigation investigations require the cooperation of several specialists for their thorough and successful prosecution.

Mr. Tannatt's paper on seepage and drainage dealt with some of the engineering difficulties encountered in the conveyance of irrigation water to the land, and some means of overcoming these difficulties and reclaiming the lands which have been rendered unproductive by seepage waters.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY.

Biochemical pocket manual, W. GLIKIN (*Biochemisches Taschenbuch. Berlin, 1909, pp. XII+348*).—This volume is designed as a ready reference book for biologists, pharmacists, agricultural chemists, students of nutrition, and others. It summarizes a large amount of valuable data arranged systematically under such subheads as air, water, the analysis of foods, condiments and foodstuffs, beer, wine, nutrition, physical data, specific gravity, and percentage content of solutions, reagents, weights and measures, and similar subjects.

The general characters of the proteins, S. B. SCHRYVER (*London, New York, and Calcutta, 1909, pp. X+86; rev. in Lancet* [*London*], *1909, I, No. 23, p. 1606*).—In this monograph the author considers the physical properties of the proteins, their general chemical character, and biological methods for their identification and differentiation. It is his purpose, he states, "to review the chief properties of the proteins, with the object of determining how far they are of value for devising methods of isolation and identification of individual members of the class."

A bibliography is included in this volume and an index is provided.

A new method of extracting a phosphorus compound of vegetable origin (phytin), A. CONTARDI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), I, No. 2, pp. 64–67; abs. in Chem. Zentbl., 1909, I, No. 13, p. 1102*).—According to the author's investigations, the phosphorus compounds in plants behave like ordinary esters except that they are more difficultly saponifiable with alkalis. In the experimental data reported rice bran was heated under pressure with acid, with alkali, and with water alone.

The determination of iodin in protein combinations, L. W. RIGGS (*Jour. Amer. Chem. Soc., 31 (1909), No. 6, pp. 710–717*).—According to the author's investigations, "10 cc. Nessler tubes of clear white glass, and giving a column of liquid 10 cm. in length, yield more delicate readings with dilute solutions of iodin in carbon tetrachlorid than larger sized tubes of a Duboscq colorimeter.

"A portion of the iodin is oxidized to iodate during the fusion and may be lost unless subsequently reduced. Devarda's alloy was used as the reducing agent. The reduction is particularly necessary in the analysis of proteins containing but a small proportion of iodin.

"Excess of nitrous acid fails to reduce iodates so that the iodin can be estimated colorimetrically in carbon tetrachlorid solution, and a sufficient excess of nitrous acid will modify or discharge the color of a carbon tetrachlorid solution of iodin. Too great a quantity of sodium nitrate must not be added during the fusion, or an excess of nitrous acid will be formed upon acidifying.

"Mixtures of protein substances and potassium iodid subjected to analysis by the foregoing process do not give results comparable with those obtained from the analysis of a protein substance containing combined iodin, such as thyroid gland tissue."

Chemical technology and analysis of oils, fats, and waxes, J. Lewkowitsch (*London, 1909, 4. ed., rev. and enl., vols. 1, pp. XX+542, figs. 54; 2, pp. XI+816, figs. 20; 3, pp. VIII+706, figs. 28*).—This new edition has been revised and enlarged to include recent investigations and statistical data on the commercial importance of oils, fats, and waxes. More attention has been given to the manufacturing processes and to the historical development of analytical processes than in earlier editions. Emulsified oils, fatty acid industry, and technology of waxes are titles of new sections which have been added. The footnotes contain complete references to patent literature.

Theory of the hydrolysis of fats and oils, J. Kellner (*Chem. Ztg., 33 (1909), No. 50, p. 453, fig. 1; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 531*).—In 3 analyses of palm-nut oil the respective amounts of glycerol found were 12.16, 5.28, and 2.11 per cent, as against 10.22, 3.17, and 1.37 per cent theoretically required for a quadrimolecular hydrolysis. The author concludes that mono- and diglycerids are present in fats partially hydrolyzed in an autoclave either by means of zinc oxid or of water alone, but not in those hydrolyzed with an aqueous solution of alkali under atmospheric pressure.

Investigation of linolenic acid in linseed oil, E. Erdmann and F. Bedford (*Ber. Deut. Chem. Gesell., 42 (1909), No. 6, pp. 1324–1333; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, pp. 530, 531*).—A yield of 15.3 per cent of linolenic hexabromid was obtained from the mixed fatty acids of the oil. The authors term the acid which yields the hexabromid α-linolenic acid. Other data are reported.

Constitution of linolenic acid, E. Erdmann, F. Bedford, and F. Raspe (*Ber. Deut. Chem. Gesell., 42 (1909), No. 6, pp. 1334–1346; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 531*).—"The linolenic acid obtained by the reduction of the hexabromid from the mixed fatty acids of linseed oil [see previous abstract] when treated with ozone, yields a mixture of two ozonids, $C_{18}H_{30}O_{11}$ (or ozonid-peroxids, $C_{18}H_{30}O_{12}$), while the ethyl esters form ozonids with the composition, $C_{20}H_{34}O_{11}$ (or $C_{20}H_{34}O_{12}$)."

Oil of colocynth seeds, C. Grimaldi and L. Prussia (*Bol. Chim. Farm., 48 (1909), pp. 93–95; abs. in Chem. Zentbl., 1909, I, No. 18, p. 1489; Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 531*).—"Colocynth seeds from Algiers, when extracted with carbon tetrachlorid, yielded a yellowish-red oil showing a faint green fluorescence and having a somewhat bitter taste and a slight odor characteristic of oils from Cucurbitaceæ. The oil was soluble in boiling absolute alcohol, and in ether, petroleum ether, chloroform, benzin, carbon bisulphid, and amyl alcohol, but only slightly soluble in boiling 95 per cent alcohol."

Preparation and chief characters of samphire oil, F. Borde (*Bul. Sci. Pharmacol., 16 (1909), pp. 132–142; abs. in Chem. Zentbl., 1909, I, No. 13, pp. 1566, 1567; Jour. Soc. Chem. Indus., 28 (1909), No. 11, pp. 623, 624*).—Analytical data are reported of oils obtained from the leaves, stalks, and fruit of the samphire plant (*Crithmum maritimum*).

Analysis of the oil from the seeds of Symphonia globulifera, J. E. Southcombe (*Jour. Soc. Chem. Indus., 28 (1909), No. 10, pp. 499, 500*).—Analytical constants are reported.

Some Sudan fats and oils, W. Beam (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 412–414*).—Analytical data are reported of oils obtained from *Balanites ægyptiaca*, *Butyrospermum parkii*, and *Euphbia alata*.

The composition of shea butter, J. E. Southcombe (*Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 499*).—The author reports analytical data on shea butter, which is used with considerable success in soap making.

"Two varieties of *Bassia parkii* are known, the fruit of which yields fats of slightly different properties, namely, shea nuts and kariti nuts. The fats from these different varieties are frequently spoken of indifferently as shea butter, but the constants of the respective fats present marked differences. . . . In the author's experience the kariti nut always yields considerably less fat of lower melting point and higher iodin value than the shea nut. . . . The insoluble acids in shea butter are oleic, stearic, and lauric, with a possible small quantity of linolic, and accordingly from the iodin value of the mixed fatty acids we are able to calculate the approximate percentage composition, namely, oleic acid 60 per cent, stearic acid 30 to 35 per cent, lauric acid 3 to 4 per cent."

The soy bean and its probable effect on the markets (*Oil, Paint and Drug Reporter, 75 (1909), No. 25, pp. 7, 8*).—It is pointed out that the recent large shipments of soy beans to Europe indicate that in the future the oil and cake of the soy bean are destined to compete in some degree with linseed, cotton-seed, and corn products.

Sugar; a handbook for planters and refiners, J. A. R. and B. E. R. Newlands (*London and New York, 1909, pp. XXXVI+876, pls. 12, figs. 236*).—This is a new edition of a work published some time ago under the title of Sugar Growing and Refining. The matters treated are the culture of sugar-yielding plants and the manufacture, refining, and analysis of cane, beet, palm, maple, melon, sorghum, and starch sugars, with copious statistics of their production and commerce, and a chapter on the distillation of rum.

Influence of clarification on the valuation of raw sugars and molasses containing invert sugar, H. C. Prinsen Geerligs (*Internat. Sugar Jour., 11 (1909), No. 126, pp. 276–281*).—Methods prescribed by various authorities are summarized.

The author proposes that "solutions of sugars, molasses, etc., in which it is desired to determine the invert sugar (glucose, or reducing sugars) should if alkalin (by phenolphthalein) be neutralized with acetic acid and the neutral or acid solution be clarified with lead subacetate, the excess of the lead salt being removed from the filtrate by the addition of sodium carbonate, sodium sulphate, or other suitable precipitant."

Diastases. Methods of research and progress made, P. Thomas (*Bul. Inst. Pasteur, 7 (1909), Nos. 2, pp. 41–52; 3, pp. 89–100; 4, pp. 137–152*).—A review and summary, with bibliography appended.

The determination of nitrogen in nitrates by means of stannous chlorid and iron filings, A. Kleiber (*Chem. Ztg., 33 (1909), No. 53, pp. 479, 480; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 10, p. 521; Analyst, 34 (1909), No. 399, p. 294*).—The method is in brief as follows:

To 7.5 cc. of a solution of 10 gm. of the substance in 150 cc. of water, add 5 gm. of solid commercial stannous chlorid, 15 cc. of concentrated hydrochloric acid, and 4 to 5 gm. of iron filings. Heat for 15 minutes on a water bath or on a wire gauze over a small flame, add 90 to 100 cc. of water, a piece of paraffin wax as large as a pea, if necessary, and about 40 cc. of concentrated caustic soda. Distill over a large flame so that distillation is complete in half an hour. Collect the distillate in 20 cc. of half-normal sulphuric acid and titrate with fourth-normal baryta solution. Deduct 0.2 from the number of cubic centimeters of baryta solution used as a correction for the ammonia left behind in the distilling flask.

The preparation of soil samples for chemical analysis, G. M. MacNider (*Jour. Indus. and Engin. Chem., 1 (1909), No. 7, pp. 447–449*).—Studies of "the proper sized sieve to use in preparing soil samples for chemical analysis when

the total amounts of plant food elements are to be determined" are reported. From the results of a chemical examination of soils prepared by passing samples through 0.5 and 2 mm. sieves the author concludes that "if we assume that the particles of soil less than 2 mm. in diameter fairly represent what should be termed the soil from which the plant derives its food, it is evident that in making determinations of the total plant food, the analysis if made on a sample prepared through a sieve with perforations less than 2 mm. in diameter, i. e., 0.5 mm., will show the soil to contain considerably more plant food than the soil from which the plant must derive its food and hence does not fairly represent the composition of the soil."

On methods of aqueous extraction, S. A. ZAKHAROV (*Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 10 (1909), No. 1, pp. 35–67, figs. 4*).—A systematic study of the influence of the factors of time and mass of solvent was made by the author, who conducted his experiments on a number of different kinds of soil.

Eight soils were treated (200 gm. of soil and 800 gm. of water) during periods of 2 minutes, 24 hours, 3 days, and 7 days. The results showed that with the increase of the time of digestion a certain increase of the amount of dissolved substances took place, the increase varying greatly with the nature of the soils. The readily soluble compounds, however, always went into solution very rapidly. Hence, in the opinion of the author, for certain practical purposes two-minute shaking of the soil with water is sufficient.

Tests were also made using water and soil in the ratios 4:1, 8:1, 16:1, 32:1, and 64:1. The results obtained showed that an increase of the amount of the solvent was accompanied by an increase of the amount of dissolved substances. The solubility of the chlorids and other easily soluble compounds, however, was very slightly or not at all dependent upon the amount of the solvent.

The determination of potash in soils, P. DE SORNAY (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 10, pp. 976–978; abs. in Chem. Abs., 3 (1909), No. 15, p. 1791*).—In the method proposed oxalic acid is added to the nitric acid and hydrochloric acid solution of the soil until frothing ceases and the calcium is precipitated. The mass is then evaporated to dryness and heated strongly until the oxalates are decomposed. The potash and soda are dissolved in water, converted into chlorids, and determined as chloroplatinates. The method is rapid and easily manipulated and gives results which agree well with those obtained with older methods.

Determination of potash in soils as phosphomolybdate, P. DE SORNAY (*Bul. Assoc. Chim. Sucr. et Distill., 26 (1909), No. 10, pp. 978–980; abs. in Chem. Abs., 3 (1909), No. 15, p. 1791*).—On precipitation of known solutions of nitrate, chlorid, and sulphate of potash with phosphomolybdic acid the author found that the potash did not combine with the acid in constant proportions. He concludes, therefore, that this method does not give accurate results in the determination of potash in soils.

Potash tests in mixed fertilizers, J. E. BRECKENRIDGE (*Jour. Indus. and Engin. Chem., 1 (1909), No. 7, pp. 409–413*).—A comparison of the official method, using water as a solvent, with other methods in which weak acid was used to extract the potash, is reported. The author concludes from his tests that the additional potash removed by extraction with dilute acid is a part of that which was added in soluble form but had become insoluble in water by mixture with other constituents of the fertilizer, probably by the formation of zeolites.

The determination of oxids of iron and alumina in Florida phosphates, H. HERZOG (*Jour. Indus. and Engin. Chem., 1 (1909), No. 7, pp. 477, 478*).—A modification of the Glaser method is described, the most important points of which are special precautions to eliminate fluorin and the use of very hot water to wash the precipitate.

The occurrence of fluorin in phosphates and the determination of fluorin in guano, O. VIBRANS (*Centbl. Zuckerindus., 17 (1909), No. 38, pp. 1116, 1117*).—In a number of raw phosphates examined the fluorin content varied from about 1 per cent in coprolites to about 7 per cent in Estremadura and Algerian phosphates. Florida phosphate containing 5.54 per cent and Carolina phosphate 2 to 3.5 per cent. In several guanos examined the percentage of fluorin was less than 1 per cent. Superphosphate prepared from Florida phosphate contained 1.33 per cent of fluorin. In several other superphosphates examined the fluorin content was less than 1 per cent. The Fresenius method is recommended as the most satisfactory for the gravimetric determination of fluorin.

A method for the determination of nitrates in sewage and waters of high chlorin content, H. C. MCRAE (*Amer. Jour. Pub. Hyg., 19 (1909), No. 2, pp. 307–311*).—A method based upon the coloration produced when narcotin dissolved in sulphuric acid is added to the nitrate solution is described.

The interpretation of the results of chemical examination of water, H. KLUT (*Ber. Deut. Pharm. Gesell., 19 (1909), No. 3, pp. 140–167; abs. in Chem. Zentbl., 1909, I, No. 19, p. 1605*).—This is a critical review and interpretation of analytical results of water examination.

The determination and meteorological value of the germ content of the upper layers of the air, M. HAHN (*Centbl. Bakt. [etc.], 1. Abt., Orig., 51 (1909), No. 2, pp. 97–114, dgms. 4*).—The apparatus and methods used in determining the germ content of the air by means of balloons are described, and the conditions which affect the germ content are discussed. The germ content and dust content of the air as a rule ran parallel. The conclusion is reached that bacteriological examinations of the air are of value only when the altitude, temperature, and moisture at the time of taking the sample are known.

Swiss food book (*Schweizerisches Lebensmittelbuch. Bern, 1907, pt. 4, 2. rev. ed., pp. VIII+43*).—Official methods are given for the analysis of fresh and preserved eggs, fruit juices and sirups, preserves and jellies, artificially charged water and lemonade, honey, compressed yeast, commercial articles, and petroleum.

A compendium of food microscopy, E. G. CLAYTON (*London, 1909, pp. XXXIX+431, pl. 1, figs. 282*).—This handbook, the author states, is compiled with additions and revision from A. H. Hassall's work on food and food adulteration. By means of reproductions of microphotographs and drawings the identification of a large number of food materials of animal and vegetable origin is taken up. There are special sections on drugs, water, and tobacco.

The book is prepared especially for the use of medical men, analysts, "and others interested in that important branch of public health work which is concerned with the purity of food, drink, and medicines."

A new method for the quantitative examination with the microscope of pulverized plant products, A. MEYER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 9, pp. 497–504, figs. 4*).—An illustrated description of microscope attachments for use in analytical work.

The detection of spoiled maize by means of the microscope, U. BRIZI (*Ric. Lab. Chim. Agr. R. Scuola Sup. Agr. Milano, 3 (1908), pp. 159–168*).—The identification of Aspergillus and other fungi by means of the microscope is discussed.

A new microchemical method for differentiating rice and wheat starch, W. LENZ (*Pharm. Post, 42 (1909), No. 49, pp. 497, 498*).—The method outlined depends upon differences exhibited under the microscope by starch grains when moistened with a sodium salicylate solution.

Separation and estimation of glycogen and starch, M. PIETTRE (*Ann. Chim. Analyt., 14 (1909), No. 6, pp. 206, 207; Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 12, pp. 226–228*).—For the detection of horse meat and meat goods a method of differentiation of glycogen and starch is briefly described which depends on the difference in solubility of these carbohydrates.

Report of the chemical inspection station in Altona for the year 1908, A. REINSCH (*Ber. Chem. Untersuch. Amt. Altona, 1908, pp. 45; abs. in Chem. Zentbl., 1909, I, No. 13, p. 1106*).—Data regarding the examination of butter, orange juice, etc., are reported. The Fiehe reaction, according to the conclusions reached, is not absolutely reliable for the detection of added invert sugar in honey.

Estimation of dry matter in honey by means of the Zeiss immersion refractometer, UTZ (*Pharm. Praxis, 7 (1908), No. 10, pp. 405–412*).—The determinations reported show, in the author's opinion, that the refractometer gives approximately accurate results.

The examination of bakers' goods made with butter, E. HOFSTÄDTER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 8, pp. 436–441*).—In the experiments reported the effects of adding eggs, spices, and flavoring matter were studied and oleomargarine and butter were compared. The author concludes that in the identification of goods made with butter reliance must be placed on the Baudouin fat reaction, since the saponification number, iodin value, and Reichert-Meissl and Polenske values are untrustworthy under the conditions.

Cryoscopy of fats, especially of butter and margarin, F. PAILHERET (*Bul. Soc. Chim. France, 4. ser., 5 (1909), No. 9, pp. 425–428; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 11, p. 620*).—For pure butters the coefficient of depression of the freezing point in benzin varied with the concentration, but was constant between concentrations of 18 and 22 per cent, the mean value of 120 samples being 0.0885. The concentration-depression curves for margarin were similar to but not coincident with the butter curves, the coefficient at concentrations between 18 and 20 per cent being 0.0764. The presence of 5 or 6 per cent of margarin in butter can be detected by the application of this method, but the cryoscopic results can generally be supplemented by the determination of other constants in order to insure detection of skillful adulteration with both margarin and coconut oil simultaneously.

On the importance of the indexes of refraction for distinguishing pure from adulterated butter, L. HOTON (*Ann. Falsif., 2 (1909), No. 3, pp. 8–26, charts 4*).—The author has continued researches previously noted (E. S. R., 20, p. 977), and has prepared tables by which adulterated butter can be detected by determining the percentage of volatile acids and the index of refraction.

Process for the control of milk; [detection of added water]. B. SAUTON (*French Patent 396,679, Nov. 24, 1908; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 11, p. 621*).—A note on a recent French patent for detecting added water to milk.

"The process is based on the red coloration which is produced when milk is treated with sodium alizarinsulphonate, and the fact that a definite quantity of sulphuric acid must be added to genuine milk so treated in order to change the red coloration to yellow. Milk containing added water requires the addition of less sulphuric acid to effect the change in color."

On the judging of milk, O. JENSEN (*Mælkeritid., 22 (1909), No. 15, pp. 359–368; Rev. Gén. Lait, 7 (1909), No. 13, pp. 301–309; N. Y. Produce Rev. and Amer. Cream., 28 (1909), No. 2, pp. 58–64, figs. 4*).—The author reports his experiments with Barthel's reduction test.

The milk examined was divided into 4 groups, as follows: (1) Good milk which retains the color 7 hours or longer, and which contains at the most 100,000 bacteria per cubic centimeter; (2) fair milk which is discolored between 2 and 7 hours and which, as a rule, has between 100,000 and 3,000,000 bacteria per cubic centimeter; (3) poor milk which is discolored between ¼ and 2 hours and which has from 3,000,000 to 20,000,000 bacteria per cubic centimeter; and finally, (4) very poor milk which is discolored in less than a quarter hour and contains still more bacteria.

It is recommended that the reduction test be combined with the fermentation test in order to determine the actual number of bacteria as well as the proportion of the good to the harmful species. Details for making the "fermentation-reduction" test are given.

A new method and apparatus for estimating fat and dry matter in cheese, HAMMERSCHMIDT (*Milchw. Zentbl., 5 (1909), No. 6, pp. 253–260, fig. 1*).—A modification of the Burstert method (E. S. R., 20, p. 112) is described.

Peanut oil in olive oil, P. VASTERLING (*Pharm. Ztg., 54 (1909), No. 50, pp. 490, 491*).—The author's experiences with different methods for detecting peanut oil are reported.

The use of the centrifuge in the assay of volatile oils, F. X. MOERK (*Amer. Jour. Pharm., 81 (1909), No. 7, pp. 326–328*).—Analytical data are reported on oils of cloves, pimenta, thyme, and cassia obtained by the use of the centrifuge and Babcock cream bottles. The methods used are described.

The determination of dry matter in wine, G. PATUREL (*Rev. Vit., 31 (1909), No. 807, pp. 611–614*).—A comparative study of methods.

A physico-chemical method of estimating ash in wine, P. DUTOIT and M. DUBOUX (*Schweiz. Wchnschr. Chem. u. Pharm., 47 (1909), No. 26, pp. 402–408*).—The proposed method is based upon differences in conductivity.

The detection and estimation of oxalic acid in cocos, C. GIRARD (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 5, pp. 83–89*).—According to the author's investigations, cocos contain a quantity of oxalic acid directly comparable with that found in sorrel, spinach, and rhubarb. The amount is not sensibly diminished by roasting. Ash analyses of different sorts of commercial cocos are reported.

The detection of coal tar colors in sausage, A. KICKTON and W. KOENIG (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 8, pp. 433–435*).—This is a summary of information regarding the occurrence and detection of coal tar dyes, with special reference to German pure food law conditions.

The detection of benzoic acid in foods, ANNA JONESCU (*Jour. Pharm. et Chim., 6. ser., 29 (1909), No. 11, pp. 523–525*).—The method described depends upon the formation of salicylic acid from benzoic acid by means of hydrogen peroxid in the presence of a small quantity of sulphuric acid.

The determination of benzoic acid in foodstuffs, ANNA JONESCU (*Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 1, pp. 16, 17*).—A discussion of priority.

The analysis of boric acid, R. MANDELBAUM (*Ztschr. Anorgan. Chem., 62 (1909), No. 4, pp. 364–369, fig. 1*).—A modification of Spindlers' method of estimating boric acid is described, in which the material is treated with phosphoric acid, distilled with methyl alcohol, and the distillate taken up in an excess of sodium hydroxid solution and glycerin, the excess being determined volumetric-

ally by titration. A stream of carbon-dioxid-free air saturated with methyl alcohol vapor is drawn slowly through the distilling flask during the operation. The details of the method are illustrated and comparative analyses reported which show that it is accurate.

Factors which influence the creatinin determination, F. C. Cook (*Jour. Amer. Chem. Soc., 31 (1909), No. 6, pp. 673–693*).—A critical study of methods.

Chemistry of animal feces. II, The determination of fatty matter in animal feces by ether and carbon tetrachlorid, A. D. Emmett (*Jour. Amer. Chem. Soc., 31 (1909), No. 6, pp. 693–695*).—The extraction with ether is less complete than with carbon tetrachlorid. The differences in the phosphorus content of the two extracts the author considers too small to be of any special significance.

"An approximate analysis of the material which was found to be insoluble in ether but soluble in carbon tetrachlorid, showed that it contained 0.185 per cent of nitrogen, 10.11 per cent of mineral matter, and 9.12 per cent of calcium, as the oxid. Other solubility tests were made upon this ether-insoluble substance and it was found to be insoluble in carbon disulphid, benzene, acetone, alcohol, and a mixture of alcohol and acetone. Tests for proteins and bile salts were negative.

"The nature of this difference in the action of the two solvents, carbon tetrachlorid and ether, is being studied further."

The determination of urea in urines, P. A. Levene and G. M. Meyer (*Jour. Amer Chem. Soc., 31 (1909), No. 6, pp. 717–722*).—A comparative study of methods.

"The results obtained indicate that the accuracy of the urea estimation is not impaired by the addition of phosphotungstic acid. Uric acid and creatinin are practically completely precipitated by phosphotungstic acid, and that which remains in solution is not sufficient to appreciably affect the urea values."

The preservation of urine by thymol and refrigeration, F. W. Gill and H. S. Grindley (*Jour. Amer. Chem. Soc., 31 (1909), No. 6, pp. 695–710*).—The authors state that the investigation reported clearly demonstrates "that the following urinary constituents, namely, chlorin, phosphorus, total sulphur, inorganic sulphur, total nitrogen, and urea nitrogen can be determined in the composite samples of normal urines which have been preserved with thymol and refrigeration for periods of 4, 8, 16, and 32 days, with as much accuracy and just as satisfactorily, giving practically the same values, as they can be estimated in the fresh daily samples of the urines. [The same is true for uric acid in composite samples preserved for periods of 4, 8, and 16 days.]

"The results of this study are not conclusive as to the influence of the preservation herein described upon the organic sulphur, the total acidity, and ammonia nitrogen determinations. . . .

"Under the conditions attending the collection, compositing, and preservation of the urine in this work, the quantitative changes which the creatinin content of the urine undergoes are insignificant."

[Miscellaneous analyses], P. Andouard (*Bul. Sta. Agron. Loire-Inf., 1907–8, pp. 7–15*).—Analyses are reported of foods, feeding stuffs, fertilizers, and other agricultural substances.

Report of the chemical control and seed control stations at Christiania, 1908, S. Hals (*Ber. Stat. Kem. Kontrolstat. og Frökontrolanst. [Christiania], 1909, pp. 54*).—The report contains the usual condensed account of the results of analytical work during the year. In all 6,398 different samples of agricultural products were examined during the year in the chemical laboratory and 4,279 samples of seeds in the seed laboratory.

[Miscellaneous analyses], R. D. Watt (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 268–271*).—Analyses are reported of wattle barks, peanut cake, pearl

millet, wheat bran, brewers' grains, castor bean, sunflower seed, wild plums, and sugar beets, and of stomachs for suspected poisoning.

The text of the laws (*Maine Sta. Off. Inspec. 12, pp. 73–92*).—This publication contains the text of the State laws concerning the sale of agricultural seeds, the grading, packing and branding of apples, the testing of creamery glassware, and the inspection of feeding stuffs, fertilizers, foods and drugs, with the income for inspection work.

METEOROLOGY—WATER.

Report on the temperatures and vapor tensions of the United States, F. H. BIGELOW (*U. S. Dept. Agr., Weather Bur. Bul. S, pp. 302, charts 4*).—In this report the temperatures and vapor tensions are reduced to a homogeneous system of 24 hourly observations for the interval 1873–1905. In his letter of transmittal the Chief of the Weather Bureau states that "these data, and the normals that have been deduced from them, will form the fundamental basis for future studies on climatology and for the investigation of the relations between plant life and the thermal and hygrometric conditions that prevail in nature. The data have also been so refined in their reductions and corrections as to be of use in the tracing of variations between the sun's activity and the temperatures of the earth."

A manual for observers in climatology and evaporation, F. H. BIGELOW (*U. S. Dept. Agr., Weather Bur. Doc. 409, pp. 106, pls. 3*).—It is stated that "this work is the result of experience with regard to the observations in the West inaugurated for the development of the water resources branch of the Weather Bureau, and it is adapted to observers of the cooperative bureaus. The remarks on climatology are such as will enable observers to classify the problem of snow and rainfall in the Sierras and Rocky Mountains according to the requirements of engineers. The part of the manual relating to evaporation contains an account of the formula now under trial, the methods of observation, and the tables necessary for executing the computations."

Bulletin of the Mount Weather Observatory (*U. S. Dept. Agr., Bul. Mount Weather Observ., 2 (1909), pt. 2, pp. 55–108, pl. 1, figs. 6, charts 6*).—This number contains the following articles: Pyrheliometer and Polarimeter Observations (illus.), by H. H. Kimball; Distribution of Gases in the Atmosphere (illus.), by W. J. Humphreys; Note on the Temperature of the Isothermal Region, by W. J. Humphreys; Storm Depth, Rate of Movement, and Intensity, by W. R. Blair; Stationary Clouds to the Leeward of Hill and Mountain Ranges (illus.), by W. R. Blair and L. C. Ross; and Upper Air Temperatures for October, November, and December (illus.), by W. R. Blair.

A summary of meteorological observations, J. E. OSTRANDER (*Massachusetts Sta. Bul. 130, pp. 3–27*).—This bulletin gives tabular summaries of observations on pressure, temperature, dew-point, relative humidity, sunshine and cloudiness, precipitation, wind movement, snow, frost, and general weather conditions made at the Massachusetts Station during the 20-year period 1889 to 1908. "It includes also records of such available and at the same time apparently reliable precipitation and temperature records as were made in Amherst previous to 1889."

The mean annual barometric pressure during the period was 30.009 in.; the maximum, 30.65 in., February 26, 1889; the minimum, 28.24 in., February 8, 1895. The mean annual temperature was 46.8° F.; the highest, 100.5°, July 2, 1901; the lowest, —26°, January 5, 1904. The mean dew-point was 39.1, the mean relative humidity 74.1. The mean annual precipitation was 44.84 in.; the greatest (1897), 57.05 in.; the least (1908), 30.68 in. The mean annual wind

movement was 51,430 miles; the greatest (1908), 63,571 miles; the least (1894), 36,257 miles. The mean cloudiness observed was 52.35 per cent.

Weather summary, L. R. WALDRON (*North Dakota Sta., Rpt. Dickinson Substa. 1908, pp. 37, 38*).—Temperature and rainfall for each month of 1906, 1907, and 1908 are given for the substation at Dickinson, N. Dak. The highest temperature recorded during the 3 years was 102° F., September 7, 1908, the lowest, —35°, January 15, 1907. The average rainfall for the 3 years was 15.11 in., being below normal in 1907 and above normal in 1906 and 1908. As a whole, the 3 years were favorable to crop production.

Distribution of temperature and humidity in the lower layers of the air in the presence of woody plants, L. RUDOVITZ (*Abs. in Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 10 (1909), No. 2, pp. 279–281*).—The results of the investigations relating to temperature have been noted from another source (E. S. R., 19, p. 1011).

As to the distribution of moisture on the soil and the plants, the observations show that in sunshine the maximum absolute humidity was most frequently noted near the surface of the soil and diminished with the distance from the latter. On the other hand, after rains the maximum absolute humidity was observed near the surface of the plant covering, diminishing both upward and downward. When there was no condensation of water vapor the maximum absolute humidity was near the surface of the covering, diminishing thence in both directions. On the other hand, when condensation began near the surface of the plant covering, where the greatest cooling occurred, the minimum absolute humidity was observed there, increasing in both directions.

Dependence of yields on the chief meteorological factors, A. LAZARENKO (*Vyestnik Russ. Selsk. Khoz., 1908, No. 24–28; abs. in Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 10 (1909), No. 2, pp. 284, 285*).—From meteorological data and records of the yields during the years 1893 to 1902 on an estate in the Government of Kharkov, the author draws the following conclusions:

(1) The yields of both winter and summer cereals depend directly on the amount of precipitation during the entire period of growth and inversely on the sum of temperatures. Millet seemed to be an exception.

(2) The yields of the winter cereals depended mainly on the precipitation during September and June, the periods of germination and early growth and of intensified growth and heading. The yields were inversely as the temperatures during those months.

(3) Summer cereals are greatly influenced by the precipitation of the preceding fall.

(4) The yields of summer wheat and oats depended largely upon the precipitation during September, May, and June.

(5) The yields of barley depended upon the precipitation during September, October, and June.

(6) The gross yield of beets depended directly upon the precipitation and inversely upon the sums of temperature during the entire growing period (April seemed to be an exception—a higher temperature during that month appearing to be favorable for the growth of beets); while the quality of the yield was inversely as the cloudiness during July, August, and September.

On the relation between climate, fertilizing, and yield, H. QUANTE (*Mitt. Landw. Inst. Breslau, 4 (1909), No. 5, pp. 647–701, pls. 2, fig. 1*).—This article deals especially with statistical methods of so handling data bearing upon the relations of climate, fertilizers, and yield of crops as to bring out their relations.

Report on the investigation of river pollution and water supplies, J. A. NEWLANDS (*Rpt. Bd. Health Conn., 1907–8, pp. 170–235, figs. 2*).—It is stated that "during the period covered by this report 298 supplies have been examined,

of which number 127, or 45 per cent, were found to be receiving sewage pollution, while in 47 cases, or 17 per cent, the quality of the water was not satisfactory. Out of 76 supplies where the waters were supposed to be the origin of typhoid fever, 58 per cent of the samples showed large amounts of sewage pollution, while the quality of the water in 11 cases, or 14 per cent, was unsatisfactory. . . .

"The fact that so many wells are receiving sewage pollution has led to an investigation of the school supplies in the State, and the results obtained thus far indicate that a great many changes are needed. Comparatively few schools in the State have their own water supply, the water being usually obtained from the nearest private well, and these are in a great many cases seriously polluted. Of 202 supplies examined thus far, 42 per cent were found to be receiving sewage pollution and 17 per cent were dirty or unsatisfactory. . . .

"No investigation of the wells on dairy farms has as yet been made, but the number of typhoid fever epidemics which have occurred along the routes of dairymen in various parts of the State would seem to show that such an investigation would be of considerable value in helping to eliminate the possibility of such epidemics."

SOILS—FERTILIZERS.

On the lime requirements of arable soils, M. Weibull (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 3, pp. 212–227, fig. 1*).—The paper describes an investigation of the relation of the lime content, loss on ignition, and reaction of South Swedish soils, conducted with a special view to devising a simple method by which the need of lime may be determined in the case of arable soils.

The results obtained lead the author to conclude that ordinary soils with less than 3 to 6 per cent loss on ignition ("humus") and containing below 0.20 per cent assimilable lime (soluble in 10 per cent ammonium-chlorid solution at boiling temperature) as a rule have acid reaction and a low power of nitrification. The soils low in lime that are not acid have a very low humus content. An alkaline reaction is found in common arable soils containing calcium carbonate (if only a trace), and in soils containing no calcium carbonate but more than 0.25 per cent assimilable lime; such soils have generally a high power of nitrification. Exceptions with regard to reaction occur especially in the case of soils with very high humus contents. Soils containing 0.20 to 0.25 per cent assimilable lime, on the other hand, have either neutral reaction or are more indefinite with regard to reaction.

If the results of the author are corroborated by further work with different types of soils, the determination of the reaction of a soil (either by titration with tenth-normal alkali or acid solution, using a lacmoid solution as an indicator, or by the use of litmus paper) will furnish a simple and satisfactory measure of the lime requirements of arable soils. The method of sampling a soil is, however, of importance in this respect, a number of separate samples of each field being generally required, rather than a single sample or a composite sample of a number of subsamples.

Investigations of the influence of cultivation on the water content of arable soils, T. Westermann (*Tidsskr. Landbr. Planteavl, 16 (1909), No. 1, pp. 75–109, figs. 5*).—The paper describes experiments with clayey and sandy soils in zinc cylinders 125 cm. high and 79.8 cm. in diameter. These were placed in the ground and provided with a watering device. A full illustrated description of the cylinders is given in the paper. The permeability of the two types of soils for water was carefully studied and the water contents of the soils

under different methods of surface treatment determined. The results show the importance of surface cultivation for the economical application of water.

Methods of determining the fertility and the nitrate nitrogen of chernozem soils, V. I. SAZANOV (*Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 9 (1908), No. 6, pp. 750–770, dgm. 1*).—The object of this investigation was to study the changes of the nitrate nitrogen content of chernozem soil at different depths and in different seasons of the year. The results showed that in the course of the growing period the upper layers of the soil are at times very rich in nitrate nitrogen, while at other times, e. g., in the early spring, they are very poor, probably as a result mainly of leaching. In making pot experiments, therefore, the time of taking the soil from the field strongly affects the yield.

Soil nitrogen, H. G. KNIGHT and F. A. SMITH (*Wyoming Sta. Bul. 82, pp. 3–32, fig. 1, dgm. 1*).—This bulletin is based upon chemical examinations of soils from a number of differently treated plats on the station farm, and deals not only with the results of these examinations but discusses in general the factors determining soil fertility with especial application to the conditions prevailing on the Laramie Plains. Attention is called especially to the unfavorable conditions for biological activity and the accumulation of humus and nitrogen in the soil.

The data reported indicate that the amount of humus in the soils of the station farm is small and it is stated that this will probably apply to the soils of the region in general. "Where legumes are grown, if nodules are not developed, the indications are that the legumes decrease the percentage of nitrogen in the soil, thereby impoverishing it instead of improving it, as is the case where nodules are developed and the nitrogen-fixing bacteria harbored. It thus appears that to increase the humus in the soil it is necessary to use well rotted manure or plow under green crops."

The growth of leguminous crops and soil inoculation, W. BIFFEN (*West Indian Bul., 10 (1909), No. 1, pp. 93–106*).—This is a rather complete review of investigations bearing on this subject, including the results of tests at different places in the West Indies of "nitro-bacterine" cultures on leguminous crops and sugar cane. The results were as a rule of a negative character, indicating that the subject needs further investigation.

Soil bacteriological investigations, C. BARTHEL (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 3, pp. 228–256, fig. 1*).—A summary of methods of technique and investigations of Remy's method of bacteriological examination of soils (E. S. R., 15, p. 859).

Soils in the vicinity of Savannah, Ga., J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circ. 19, pp. 19*).—This is a preliminary report on an examination of the soils of this region made in April, 1909, with a view to determining not only the character of the soils but their adaptation to the production of staple and special crops. The report also contains climatic data for the region. The soils are comprised mainly in the Norfolk and Portsmouth series of the Atlantic coast and are specially adapted to truck farming. Drainage is needed in case of certain of the finer soils of the Portsmouth series.

Niter soils, H. GRUNER (*Deut. Landw. Presse, 36 (1909), No. 46, p. 491*).—This name is given in Europe to soils which show a white efflorescence on the surface in times of drought. Chemical analyses of the acid extracts of three such soils are reported, but furnish no evidence of the presence of any considerable amounts of nitrate.

The action of manure, V. VINER (*Abs. in Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 10 (1909), No. 2, pp. 217, 218*).—A summary is given of records of systematic manuring of both summer and winter crops on a large estate during a period of about 20 years.

The dependence of the effect of the manure upon seasonal variations is very clearly brought out, the effect being greater in wet seasons than in dry. The effect of the manure on the second crop of wheat was more directly dependent upon the season than was true in the case of the first crop. In other words, the increase of yield due to the application of manure was more constant in case of the first crop than of the second.

The decomposition of manure, P. Ehrenberg and E. Reichenbach (*Mitt. Landw. Inst. Breslau, 4 (1909), No. 5, pp. 853–872*).—The principal facts brought out by the experiments here reported are that there was no appreciable loss of ammonia from compact manure heaps in which no preservative of any kind was used, but that in the course of two months there was a loss of about 10 per cent of nitrogen in elementary form.

Fertilizers, D. N. Prianishnikov (*Uchenie ob Udobreniĭ. Moscow, 1908, 3. ed., pp. 348+II, pls. 8, figs. 39*).—A third edition.

Report of the work of the agricultural societies of Seeland in plant culture, 1908, O. H. Larsen (*Ber. Landbofor. Virks. Planteavl. Själland, 1908, pp. 354*).—The report contains an account of the activities of the agricultural societies of Seeland during the year in the line of cooperative fertilizer trials, variety tests, demonstration plats, etc., 264 separate fertilizer trials being conducted, of which 208 were made with different fertilizers for small grains, root crops, potatoes, and hay crops, and 25 with sodium and calcium nitrates for spring grains, ruta-bagas, and sugar beets. The value of the two fertilizers differed but slightly in the case of the grains, but the sodium nitrate produced somewhat better results than the calcium nitrate with both ruta-bagas and with sugar beets.

Investigations relative to the use of nitrogenous materials, 1898–1907, E. B. Voorhees and J. G. Lipman (*New Jersey Stas. Bul. 221, pp. 3–52, dgm. 1*).—The data accumulated in these experiments during 10 years are discussed under the following heads: "(1) The yields of dry matter and of nitrogen in the cylinder soils; (2) the proportionate amounts of nitrogen in the crops as affected by fertilization; (3) the utilization of nitrogen in different nitrogenous materials; (4) the relative efficiency of the nitrogen in different materials; (5) the residual effect of nitrogenous substances; (6) denitrification; (7) the effect of special treatment on the income and outgo of nitrogen in the soil."

As explained in previous accounts (E. S. R., 19, p. 626), these experiments have been conducted in galvanized iron cylinders open at both ends and sunk nearly to their tops in the soil. The soil used was the Penn loam typical of a large area in New Jersey and well adapted to the growth of cereals and grasses. The nitrogenous fertilizing materials used included "sodium nitrate, ammonium sulphate, dried blood, and four grades of cow manure—solid excreta, fresh; solid and liquid excreta, fresh; solid excreta, leached; solid and liquid excreta, leached." The crops grown in the experiments have included corn, oats, wheat, and timothy, with an intercrop of millet.

Full data are given for the yields of nitrogen and dry matter for each crop during the period of the experiment, as well as estimates of the proportion of nitrogen applied in the fertilizing materials recovered in the crops. Averaging the results for the whole period it was found that "(1) the fresh manures were, on the average, utilized better than the leached manures; (2) the solid, fresh, was utilized to a slighter extent than either of the leached manures; (3) the solid and liquid, fresh, was utilized to better advantage than the solid, fresh; (4) the solid and liquid, leached, was utilized to better advantage than the solid, leached; (5) the larger application of nitrate was utilized to about the same extent as the smaller application; (6) in the presence of 10 gm. of nitrate,

the nitrogen in all of the manures was utilized to better advantages than it was in the presence of 5 gm. of nitrate; (7) equivalent quantities of nitrogen in the form of sodium nitrate, ammonium sulphate, and dried blood were utilized in the order named; (8) equivalent quantities of nitrate and ammonium sulphate, when used together with solid manure, leached, were utilized in the order given; (9) solid and liquid—fresh, solid—fresh, solid and liquid—leached, solid—leached—when used in combination with nitrate, were utilized in the order named; (10) the proportion of nitrogen recovered in the crops ranged from 62.09 per cent to 22.31 per cent."

The average relative availability of the different nitrogenous materials on all crops for the 10-year period, 1898–1907 (taking that of sodium nitrate as 100), was as follows:

Relative availability of nitrogen of different fertilizing materials in cylinder experiments.

Sodium nitrate	100.0
Ammonium sulphate	69.7
Dried blood	64.4
Solid manure, fresh	35.9
Solid and liquid manure, fresh	53.0
Solid manure, leached	38.9
Solid and liquid manure, leached	43.1

The data for the residual effect of the different fertilizers on 1 crop of millet and on 3 crops of corn are reported, showing that entirely apart from the residual effects of the manures themselves, there may be very marked residual effects from the crop residues.

The results of the observations on denitrification indicate that under ordinary conditions the loss of nitrogen as a result of denitrification is too small to be of serious economic significance.

A method for the accurate determination of small variations in the nitrogen content of soils is briefly described.

Experiments on the utilization of nitrogen in fertilizer materials, E. B. Voorhees and J. G. Lipman (*Jour. Indus. and Engin. Chem., 4 (1909), No. 7, pp. 397–408*).—This article summarizes some of the results of the experiments carried on by the New Jersey Stations with reference to the relative availability of the nitrogen of the different fertilizers used, as noted above.

Experiments with calcium cyanamid, D. Kahan (*Khozyaistvo, 1908, No. 14; abs. in Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 10 (1909), No. 2, pp. 225, 226*).—In sand cultures calcium cyanamid applied 8 days and even 30 days before planting interfered with germination. In experiments with soils the best results were obtained when the material was applied 4 days before sowing. In this case the cyanamid was somewhat superior to ammonium sulphate as a fertilizer.

The toxicity of lime nitrogen and nitrogen lime, Kionka (*Fühling's Landw. Ztg., 58 (1909), No. 11, pp. 397–404*).—The experiments previously noted (E. S. R., 21, p. 24), showing the poisonous effect of these substances on frogs, rabbits, and dogs, are thought not to indicate any serious danger to man in handling the materials.

The new nitrogenous products, nitrate of lime and cyanamid, C. Pluvinage (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 25, pp. 753–756*).—The rapid progress which has recently been made in the manufacture and agricultural utilization of these products is reviewed.

The utilization of atmospheric nitrogen, particularly for the manufacture of air saltpeter, A. BERNTHSEN (*Jour. Indus. and Engin. Chem., 1 (1909), No. 7, pp. 466–475*).—The development of processes for this purpose is explained in some detail.

Production of ammonia from atmospheric nitrogen, H. C. WOLTERECK (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1909), No. 6, pp. 54–59; abs. in Sci. Abs., Sect. A—Phys., 12 (1909), No. 137, p. 316*).—The results of the reduction of moist peat in horizontal iron retorts are reported, showing a production of ammonia greatly in excess of that which could be accounted for by the nitrogen in the peat and leading to the conclusion that part at least of the ammonia must have been produced synthetically from the nitrogen of the air. The results "clearly prove that nitrogen is capable of chemical reaction if present during the moist oxidation of certain metals, or of carbon within certain limits of temperature."

The production of ammonia from atmospheric nitrogen by means of peat, H. C. WOLTERECK (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 675, 676*).—This is an abstract of a paper presented at the Dublin meeting of the British Association for the Advancement of Science, giving the results of the experiments by the author noted above.

Production and consumption of sulphate of ammonia in 1908, MAIZIÈRES (*Engrais, 24 (1909), No. 26, pp. 713–715*).—The total production is given as 829,500 tons, of which Great Britain produced 314,000 tons, Germany 313,000, France 57,000, Austria-Hungary 35,000, Belgium 30,000, and the United States about 20,000. Germany consumed during the year 284,000 tons, Great Britain 79,000, France 89,000, and Belgium and Holland 67,000.

The rational use of superphosphates, J. DUMONT (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 18, pp. 1205–1207; abs. in Rev. Sci. [Paris], 47 (1909), I, No. 20, p. 636*).—Investigations are reported which indicate that the most effective way of using superphosphates is in mixture with thoroughly fermented farm manure. In this way the reversion which usually occurs in the soil under ordinary methods of application is largely prevented, the phosphoric acid combining with the humus to form humophosphates, which are readily available.

Fertilizing with wood ashes, A. A. KALUZHSKIĬ (*Vycstnīk Russ. Selsk. Khoz., 1906, No. 34; abs. in Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 9 (1908), No. 6, pp. 780, 781*).—Experiments with oats corroborated the view of Prianishnikov that wood ashes should be applied in much smaller quantities than is customary, 270 lbs. per acre giving the best results.

Commercial fertilizers; the service of a fertilizer control; soil physiography, J. L. HILLS, C. H. JONES, and H. L. MINER (*Vermont Sta. Bul. 143, pp. 119–260*).—This bulletin reports the results of inspection of 133 brands of fertilizers, the output of 12 companies, with discussions of the quantity and quality of the plant food furnished by these fertilizers, selling prices and valuation, and comparison of the composition of the fertilizers sold during the season of 1908–9 with that of the same fertilizers sold during previous years.

A discussion is also given of "the service of a fertilizer control, the methods of its financing, of sampling and analysis, of the publication of results, together with a detailed exposition of the interpretation of an analysis, as well as an explanation of the use which buyers may make of the analytical and the other statements of the control."

A special feature of the bulletin is an article on soil physiography in which an attempt is made "to cover the sundry internal and external forces, particularly those of the air, ground water, water in motion, ice action and life, in their relations to rock disintegration and soil formation."

Inspection and analyses of commercial fertilizers on sale in the State. W. F. HAND ET AL. (*Mississippi Sta. Circs. 25, pp. 4–23; 26, pp. 4–23*).—These circulars report the results of analyses of 181 samples of fertilizers examined during the season of 1907–8.

AGRICULTURAL BOTANY.

The theory of the respiration of plants, V. I. PALLADIN (*Izv. Imp. Akad. Nauk. (Bul. Acad. Imp. Sci. St.-Pétersb.), 6. ser., 1909, pp. 459–478, 519–546; Biochem. Ztschr., 18 (1909), No. 1–2, pp. 151–206, figs. 2; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 560, II, pp. 511, 512*).—After giving an exhaustive discussion of previous work on aerobic and anaerobic respiration, the author concludes as follows:

"The first reactions of respiration are reactions of anaerobic decomposition, brought about by enzyms. These reactions are similar to the reactions resulting from dry distillation, consisting of a series of successive reductions and oxidations by means of combined oxygen in the network of organic substances. Besides dextrose, other substances may afford material for anaerobic respiration, which may proceed without formation of alcohol but with formation of other compounds. Anaerobic respiration transforms stable constituents of the plants which do not undergo direct oxidation into extremely unstable, readily oxidizable substances. Alcohol is formed only during anaerobic respiration, and not during normal respiration in air, intermediate substances which are formed earlier than alcohol, and are hence more labile, themselves undergoing oxidation. Aerobic plants are capable of living in media free from oxygen without developing carbon dioxid.

"Respiratory oxydases are ordinary pigment-forming enzyms, and are incapable of direct oxidation of the products of anaerobic decomposition which are related to compounds of the aliphatic series. The respiratory chromogens are very widely distributed in plants; they are not oxidized directly by the oxygen of the air, the presence of special oxydases being required for the various chromogens. The respiratory pigments formed in plants usually undergo immediate reduction to colorless chromogens, these chromogens being related to aromatic compounds. Dextrose, as the initial product of the assimilation of carbon, is the parent substance from which aromatic compounds are formed in plants . . . To compounds, in the form of which the chromogens occur in a combined state in the tissues, the author gives the name prochromogens."

Notes on the day and night growth of plants, NOMBLOT-BRUNEAU (*Jour. Soc. Nat. Hort. France, 4. ser., 10 (1909), June, pp. 350–352*).—A summary is given of observations made on the rate of growth of scions of different varieties of pears grafted on their own stock and on quinces. The shoots were measured every morning and evening and the amount of growth made during the first season is tabulated.

It is shown that there is practically no difference between the amount of growth taking place in the day and at night. The greatest development in 24 hours was produced during the period from May 31 to July 6. The period of greatest growth was between June 26 and July 6, and the total period of active growth covered 3 months.

As a practical application of the observations, the author states that pinching the buds retards the development from 10 to 15 days, and as a consequence delays the ripening of the twigs. The active growth begins to slacken about July 10 and the pinching should not take place after July 6.

Other things being equal, the greatest growth takes place during cloudy weather.

Other observations were made showing the point below which there was no elongation of the shoots and the growth of different species during 24 hour periods. With cherries, peaches, pears, apples, and plums there was no elongation of the tissues 9 to 12 cm. below the tip of the shoot or below the third leaf. At the second leaf or at a distance of 5 to 8 cm. from the tip of the shoot the lower internode continued to elongate, but only about 5 to 10 mm. With grapes the elongation below the second leaf amounted to 2 cm. The maximum growth in 24 hours was 27 mm. for pears, approximately the same for apples, plums, and cherries, 30 to 35 mm. for peaches, and 50 mm. for grapes.

The relation between the form of leaves and their light requirement, J. WIESNER (*Umschau, 13 (1909), No. 7, p. 152; Rev. Gén. Sci., 20 (1909), No. 11, p. 481*).—In a memoir presented before the Vienna Academy of Sciences the author discusses the relation which exists between the form of leaves and their light requirements.

He shows that by leaves being deeply cut or reduced to very narrow forms, as in the case of the conifers, there is not only a great increase in the total leaf surface but the reduction in form results in a decided diminution in the heat from the sun's rays, and consequently favors the assimilatory action of the leaves.

As illustrating the resistance of narrow leaves to the heat of the sun, the author cites the fact that a fragment of china-grass introduced under a lens did not take fire for several minutes, while a fine-mesh tissue composed of about 400 cells of the same was almost immediately consumed. Under similar conditions a bundle composed of 50 bast fibers took fire very quickly, while one composed of only 25 did not begin to show the action of heat for 3 or 4 seconds and a single bast cell remained unaffected for 4 minutes.

Action of fertilizing salts on plant enzyms, M. X. SULLIVAN (*Jour. Biol. Chem., 6 (1909), No. 2, p. XLIV.; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 560, II, p. 514*).—The author reports that potassium sulphate retards, while the nitrate and mixtures of calcium hydrogen phosphate, sodium nitrate, and potassium sulphate accelerate the oxidizing action of wheat roots. Mixtures of the three salts in equal quantities increase, while the phosphate alone increases and the sulphate alone diminishes, the activity of malt diastase. Sodium nitrate had no action whatever. In his experiments plants were grown in a mixture containing 100 parts per million of phosphoric acid, ammonia, and potassium oxid, to which was added 200 mg. of starch paste. The roots converted the starch into sugar. This activity was retarded by potassium sulphate and calcium hydrogen phosphate but increased by the sodium nitrate or a mixture of the three salts.

The distribution of rennet in the various parts and tissues of plants, C. GERBER (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 15, pp. 992–995; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 560, II, p. 512*).—The coagulating power of rennet obtained from various parts of plants has been determined with reference to milk at a temperature of 42° C.

The author found that in the green parts of the plants the rennet is roughly proportional to the amount of chlorophyll. The reproductive apparatus contains more rennet than the vegetative organs, and in the case of some Compositæ the styles contain more than the achene. Rennet appears to be distributed in the plant in the same manner as the proteolytic ferment, and it is thought that possibly both activities may be due to one and the same enzym. In the root and stalk of plants the bast alone contains any appreciable rennet activity, but

rennet is also present in the green bark. In the case of the paper mulberry, the green parts of which contain pectase, rennet can be better studied in the bast of the stalk than in the leaves.

The greening of potatoes, G. MASSEE (*Jour. Bd. Agr. [London], 16 (1909), No. 3, pp. 177–180, pl. 1*).—An account is given of three experiments conducted at Kew for the purpose of ascertaining in what way greening of potatoes proves beneficial.

The experiments showed that potatoes greened by exposure to light do not lose as much water as those kept in the dark, and that the starch is not transformed into sugar as in case of ordinary storage. A potato not greened was found to lose six times as much in weight as a potato of equal weight that had been greened. The act of greening is said to cause the skin of the tuber to become comparatively impervious to water and gases, and hence there is a relative cessation of growth and loss of weight.

The greatest benefit derived from greening, it is said, will be obtained when it is practiced in the autumn immediately after the potatoes are dug. In addition to the advantages indicated, autumn greening will to a great extent check the ravages of winter rot, and this treatment will result in the production of short, sturdy, firmly-attached sprouts, which do not break off during planting.

The anatomy and some of the biological aspects of the "American mistletoe," H. H. YORK (*Bul. Univ. Texas, Sci. Ser. No. 13, pp. 31, pls. 13*).—A study is reported on the anatomy and some of the biological phenomena of the American mistletoe (*Phoradendron flavescens*).

The method of dissemination, germination, formation of aerial shoots, rate and period of growth, etc., are described, together with notes on the effect mistletoe has upon its host. The author claims that the mistletoe is disseminated almost entirely by birds. It is a slow grower and its maximum period of growth coincides with that of its host, growth apparently continuing throughout the entire summer.

It is not a total parasite, since it is abundantly supplied both in its aerial shoots and in the haustoria with chlorophyll, and is not entirely dependent upon its host for food substances. Its relation to the host is largely that of a water parasite, and the carbohydrates it takes from the host plant are those which have been stored in the wood.

In the region covered by the study, the mistletoe favors in its attack the hackberry, elm, mesquite, and osage orange. The immunity of certain trees to mistletoe is largely due to the character of the external surface and the thickness of the outer corky layer.

It is said that mistletoe does not directly kill the trees, but causes them to become dwarfed and the branches greatly distorted. Indirectly parts or whole trees may be killed through the action of wood-boring insects which first attack the mistletoe and through it the host tissues, leaving a way open for fungi, bacteria, and wood-boring insects.

The author has carried on some experiments for killing mistletoe which have proved quite successful. These consist of cutting out the aerial shoots and shaving the outer layers of infected regions with a drawing knife so as to expose the haustorial portions of the plants. These are then thoroughly coated with coal tar to prevent further development of the haustoria and to keep out fungi and insects.

Present problems in plant ecology (*Amer. Nat., 43 (1909), Nos. 510, pp. 356–378; 511, pp. 420–431; 512, pp. 472–493*).—This is a series of papers presented before the Botanical Society of America at the Baltimore meeting in 1909, the titles and authors of the different papers being as follows: The Trend of Ecological Philosophy, H. C. Cowles; Present Problems of Physi-

ological Plant Ecology, B. E. Livingston; Vegetation and Altitude, C. H. Shaw; Problems of Local Distribution in Arid Regions, V. M. Spalding; and The Relation of the Climatic Factors to Vegetation, E. N. Transeau.

FIELD CROPS.

[Field crops in 1908 at the Dickinson Substation, North Dakota], L. R. WALDRON (*North Dakota Sta., Rpt. Dickinson Substa. 1908, pp. 4–7, 9–23, 27–33, pls. 5*).—Notes are given on cultural and other tests with a large number of field crops.

It is stated that ordinary upland, medium loam soils demand artificial inoculation for successful alfalfa culture. Uninoculated alfalfa the second season produced cured hay in amounts ranging from 888 to 1,170 lbs. per acre. Clover winterkilled largely and yielded only from 15 to 50 lbs. of seed per acre. This is considered due to the newness of the soil and the lack of sufficient inoculation. Brief notes on other leguminous crops are also given.

Brome grass sown at the rate of 16 lbs. yielded 1,272 lbs. per acre, as compared with 1,848 lbs. for a plat sown at the rate of 24 lbs. of seed per acre. The use of a nurse crop in starting this grass had apparently a very detrimental effect. Manured plats gave an average yield per acre of 2,012 lbs. as compared with 1,242 lbs. secured on plats receiving no manure. The yield from wild prairie was at the rate of 776 lbs. of hay per acre. Among different annual hay crops hull-less barley stood first with 4,532 lbs. per acre, this yield being about 900 lbs. greater than the yield of oats.

The yields of different varieties of cereals, potatoes, and root crops are recorded in tables. The average yields of wheat for 3 years for the different classes under experiment were as follows: Durum 24.9, Fife 21.5, and Blue Stem 21 bu. per acre. A comparison of the yields of oats, barley, and emmer for 2 years shows emmer at a decided disadvantage each year. The average yield of oats for the 2 years was 2,074 lbs. per acre, of barley, 1,883 lbs., and of emmer 1,494 lbs.

Sowing durum wheat in 1907 at the rate of 3⅓ pk. per acre gave practically as good a yield of grain as sowing at the rate of 5 pk. In 1908 a similar experiment gave rather indefinite results. The best yields of oats in 1908 were secured from sowing at the rate of 5 and 6½ pk. per acre.

Among 25 varieties of potatoes the best showing was made by Early Eureka and Early Michigan, the yields being 138.2 and 135 bu. per acre, respectively. In a test with small and large seed tubers it was found that the large tubers produced a net value of $58.41 per acre and the small tubers a net value of $32.73. In a comparison of mangels, sugar beets, ruta-bagas, carrots, and artichokes, ruta-bagas produced the largest yield, 12 tons and 1,960 lbs. per acre, followed by sugar beets with 12 tons and 1,300 lbs.

The work of the San Antonio Experiment Farm in 1908, F. B. HEADLEY and S. H. HASTINGS (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 34, pp. 17, fig. 1*).—The meteorological data at San Antonio are reported for a series of years and discussed. The soil conditions of the region are described and the equipment of the San Antonio Experiment Farm and the lines of work undertaken are briefly noted.

In 1908 Appler Rustproof oats produced the highest yield, 37.7 bu. per acre, among 4 different varieties. Boswell Winter oats were so seriously injured by rust that no grain was produced. The straw of Red Algerian and Appler oats was weak and caused these varieties to lodge badly. The straw of Culberson oats was very stiff and the entire crop stood up well, but its yield was not so large as that of the other 2 varieties.

Among 63 strains of corn collected from corn exhibits throughout the State the yields varied from 20 to 64 bu. per acre, the variety known as Laguna giving the best results. In addition to this test a comparison of 5 varieties ranged in yield from 25.7 bu. for Boone County White to 51.5 bu. for Chisholm. Corn after millet yielded at the rate of 32.9 bu. per acre, while corn after oats yielded only 13.5 bu. This difference in yielding power is believed to be due to the action of cutworms upon the oat land.

Of 7 varieties of sorghum Sumac and Red Amber were the most productive, yielding 12.29 and 10.17 tons per acre, respectively, from a planting made March 30. The most productive millet tested was Kutki (*Panicum psilipodium*), which yielded at the rate of 2.50 tons per acre. Bonavist beans yielded hay at the rate of 2,560 lbs. per acre. A plat of Spanish peanuts yielded at the rate of 19½ bu. per acre. Notes are given on the various forage crops, including clover, cowpeas, and Canada peas.

Cotton and corn grown in drills, as compared with planting in check rows, showed little difference in yield. Medium late planting of cotton seemed likely to give better results than very early planting.

The eradication of Johnson grass by clean cultivation was found more difficult and expensive than when done in connection with growing crops to keep down the soil moisture supply.

Report on the work of the experiment stations of Indo-China in 1908, C. Lemarié (*Bul. Écon. Indo-Chine, n. ser., 12 (1909), No. 77, pp. 98–119*).—Cultural tests with textile, oil, perfume, rubber, sugar, spice, paper, cereal, starch, vegetable, and forage plants, are briefly noted.

Forage crops, W. S. Hotchkiss (*Texas Sta. Bul. 121, pp. 6, 7*).—Notes are given on culture tests at the station with several forage crops. Rescue grass sown in September yielded 4,200 lbs. of cured hay per acre the following May. Oats sown in the fall after cowpeas gave an average yield of 2,100 lbs. of grain and straw per acre on old, worn out land. The first cutting of alfalfa, amounting to 1,900 lbs. of cured hay per acre on April 24 is reported.

Grass and clover seed production in Denmark, Hollmann (*Ber. Land u. Forstw. Auslande, 1909, No. 19, pp. 31*).—This is a general article on the subject presenting statistical matter with reference to the production of the seed of various grasses and clovers. The general results secured in the improvement of these crops are also discussed.

Conditions affecting the value of market hay, H. B. McClure (*U. S. Dept. Agr., Farmers' Bul. 362, pp. 29, figs. 7*).—This bulletin discusses the hay trade, hay areas, yields, prices, fertilizing elements and nutritive substances in hay, and the market values of the different grades of the product. The grades of hay adopted by the National Hay Association are quoted. The author believes that the clover hay area of the country is increasing and that more straight clover and timothy mixed is sent to the market than formerly.

Cordage fibers, H. R. Carter (*London, 1909, pp. 116, figs. 14, pl. 1*).—This book describes the following fiber plants, and discusses their value and uses: Indian jute, soft hemp, Manila hemp, sisal hemp, East Indian hemp, aloe, agave, New Zealand hemp, ramie, coir, flax, and cotton. A chapter is devoted to some of the lesser known cordage fibers, and also to the decortication, chemical characteristics, and physical structure of these cordage fiber plants.

Alfalfa, E. Nelson (*Idaho Sta. Bul. 66, pp. 3–37, figs. 6*).—This is a general treatise on alfalfa culture, with special reference to conditions in the irrigated sections of Idaho. Notes are also given on alfalfa on dry land, alfalfa for pasture, seed production and soil improvement, alfalfa by-products and the feeding value of alfalfa.

The influence of artificial manures on the yield and malting quality of barley grain, C. CROWTHER (*Univ. Leeds and Yorkshire Council Agr. Ed. [Pamphlet] 75, 1909, pp. 36*).—The results of 2 series of experiments conducted from 1900 to 1903, and from 1904 to 1906, are reported.

It is found that when barley succeeds a cereal, a satisfactory increase in grain and straw may be secured by the use of commercial fertilizers supplying nitrogen. Nitrate of soda on wold land, except in very wet seasons, proved much more effective than a dressing of sulphate of ammonia furnishing the same quantity of nitrogen. The use of complete applications of fertilizer containing nitrogen in a soluble form is recommended. The use of guano was found less profitable for the money expended than a suitable mixture of commercial fertilizer.

The malting value of the grain in general did not appear to be very much influenced by the fertilizer applications, but rather as being controlled by the climatic conditions during the ripening period. During the 7 years covered by the experiments, the finest malting barley was grown when nitrate of soda, superphosphate, and kainit had been applied.

Latest results with reference to the need of applying fertilizer in barley culture, J. STOKLASA (*Deut. Landw. Presse, 36 (1909), Nos. 27, pp. 295, 296; 28, pp. 308, 309*).—The results of investigations with barley are reported as showing that for every 100 gm. of dry matter contained in the root, barley gives off 7 gm. of carbon dioxid every 24 hours, oats 12.2 gm., wheat 9 gm., and rye 11.1 gm. The author points out that it is probably the low respiration capacity of the root system of barley that causes its greater development as compared with the other three cereals mentioned when soil conditions admit it.

The data recorded show that about the beginning of July the greater portion of the total food material has been taken up by the barley plant, and that for this reason the farmer should aim to assist the plant through applications of fertilizers early in the season. Potash is regarded as ranking first in importance, nitrogen second, and phosphoric acid third. The results also indicate that where adequate quantities of phosphoric acid and potash have been applied, a further application of nitrogen is not always necessary for barley when this crop follows sugar beets to which nitrate of soda has been applied. The author's observations for 20 years appear to show that the use of 250 kg. of 16 to 18 per cent superphosphate and 200 kg. of 40 per cent potash salt per hectare gives an increase in the yield of grain of from 400 to 900 kg. (356 to 801 lbs. per acre).

Germination tests indicated that the quantity of carbon dioxid given off in the process of germination increases with the protein content of the seed. It was found that a barley containing 10 per cent of protein loses approximately 10 per cent in substance, whereas one containing 12 per cent loses 15 per cent.

Bermuda grass, L. A. MOORHOUSE, W. L. BURLISON, and J. A. RATCLIFF (*Oklahoma Sta. Bul. 85, pp. 3–14, figs. 6*).—This bulletin reviews the work with Bermuda grass done by the Oklahoma Station (E. S. R., 17, p. 1062; 19, p. 332), and gives general directions for the preparation of the soil, time and method of planting, caring for the crop, and for its eradication. White clover sown on a Bermuda grass lawn was observed to make a good growth, and it is concluded from this fact that these 2 plants may possibly be used as a pasture mixture with profit.

Increasing the yield of corn, G. W. CARVER (*Alabama Tuskegee Sta. Bul. 15, pp. 5–11, figs. 5*).—Methods of increasing the yield of corn are discussed and the results of variety and fertilizer tests are briefly reported. Of 19 varieties, Mosby Prolific ranked first in both yield of grain and fodder with 40.375 bu.

and 7.875 tons per acre, respectively. The use per acre of 75 lbs. each of acid phosphate and muriate of potash and 8 tons of barnyard manure before planting, and the application of 100 lbs. of nitrate of soda just before tasseling, is considered remunerative.

Experiments in the culture of corn, M. DE FLACOURT (*Bul. Écon. Indo-Chine, n. ser., 12 (1909), No. 76, pp. 55–59*).—Experiments were conducted at the experiment station of Thanh-Ba, Tonkin, with 2 native varieties and 1 introduced variety of corn. The introduced variety, known as Petits Côtons, gave better results than the 2 native sorts when cultivated either on rice lands or on rolling ground.

Corn culture, J. M. KIMBROUGH (*Georgia Sta. Bul. 84, pp. 211–220, fig. 1*).—A test with 13 varieties of corn resulted in the heaviest yields from Marlboro Prolific, Stone Flint, Granberry Choice, Whelchel Improved, and Rockdale, which produced 39.59, 37.36, 33.92, 32.66, and 32 bu. per acre, respectively. The largest percentage of shelled corn, 86.9, was produced by Roper Gourd Seed, and the smallest, 79.7, by Whelchel Improved. The number of ears required to produce a bushel of shelled corn ranged from 102 for Funk Yellow Dent to 191 for Granberry Choice.

Seed corn from long ears produced a yield of 24.99 bu. per acre as compared with 26.75 bu. for seed from short ears. The variety used in this test was Marlboro Prolific.

A comparison of the Williamson, Gilmore, and ordinary methods of raising corn resulted in a yield of 22.87, 29.58, and 34.11 bu. per acre for the 3 methods, respectively. In the opinion of the author an unfavorable season prevented the fertilizer applied to the Williamson and Gilmore methods from benefiting the crop.

A fertilizer experiment was conducted to determine the relative values of green cotton seed and cotton-seed meal. All plats received acid phosphate applied at the rate of 150 lbs. and muriate of potash at the rate of 7.28 lbs. In addition to this application cotton-seed meal was given at the rate of 180 lbs. per acre on certain plats and green cotton seed at the rate of 450 lbs. on others. The cotton-seed meal plats yielded at the rate of 31.28 bu. and the cotton seed plats at the rate of 33.54 bu. per acre. These results are taken as indicating that cotton-seed meal is too valuable for feeding purposes to be used as a fertilizer.

Cotton culture, J. M. KIMBROUGH (*Georgia Sta. Bul. 84, pp. 221–232*).—In a variety test the leading varieties and their yields of seed cotton per acre were as follows: Rowden 1,346 lbs., Schley 1,318 lbs., Georgia Best 1,259 lbs., Layton Improved 1,226 lbs., Cleveland Big Boll 1,222 lbs., Philip Improved 1,217 lbs., Thornton Russell 1,206 lbs., and Park Russell 1,202 lbs. Schley led in acre yield of lint with 474 lbs., being followed by Layton Improved with 457 lbs. and Philip improved with 450 lbs. The lowest ranking variety, Robinson Big Boll, produced only 313 lbs. The number of bolls required to make 1 lb. of seed cotton ranged from 70 in Rowden to 131 in Franklin Improved and Broadwell Double Jointed. This last-mentioned variety was the earliest and the least productive in the test. It produced 1,107 lbs. of seed cotton per acre, of which 368.68 lbs. was picked August 28, 540.08 lbs. September 10, and 197.52 lbs. October 5. All other varieties gave a fourth picking, which was made October 30.

In a second variety test the best yielding sorts were Park Russell, Keenan, Triumph, Schley, Moss Improved, and Sistrunk Prolific. Screened seed yielded at the rate of 1,171 lbs. of seed cotton per acre, as compared with 1,180 lbs. for unscreened seed.

The results of a comparison of different fertilizer applications indicate that it is advantageous to use home-mixed fertilizers. High-grade guano in this test,

although costing more than the other formulas, made the poorest yield. It was also found that it is apparently more profitable to apply all the fertilizer before planting the crop, with the possible exception of nitrate of soda or some other readily available substance.

King cotton, J. L. WATKINS (*New York, 1908, pp. 321, pls. 13*).—This book is a historical and statistical review of the cotton industry of the United States from 1790 to 1908. The first chapter of the book treats of the earliest introduction of cotton culture, the difficulty of separating the lint from the seed, and the invention of the gin. Subsequent chapters are devoted successively to conditions in the several cotton-producing States.

The production of cotton in Egypt, F. C. ROUX (*La Production du Cotton en Égypte. Paris, 1908, pp. VIII+410*).—This book devotes several chapters each to the history, culture, industry, and commerce of cotton in Egypt. A bibliography of several pages is given, and special articles on the causes of yield reduction in Egypt and the process of mercerizing are presented. There is also a list of the cotton gins in Egypt.

Hop culture on moor soils, W. BERSCH (*Ztschr. Moorkultur u. Torfverwert., 7 (1909), No. 3, pp. 109–140, pl. 1*).—This article discusses in detail the culture of hops on moor soils and describes the progress that culture has made in certain hop-growing regions. Together with this information the chemical analyses of different parts of the plant and the results of fertilizer experiments are reported.

It was found that on the moor soils near Ibm, Austria, the most profitable fertilizers were Thomas slag, raw phosphate, 40 per cent potash salt, and nitrate of soda. Bone meal, superphosphate, and barnyard manure gave unsatisfactory results. It is recommended that Thomas slag be applied at the rate of 80 kg. of phosphoric acid per hectare (about 71.2 lbs. per acre) in the first year and at the rate of about 60 kg. in the second and following seasons. The use of about 100 kg. of potash and of 40 kg. of nitrogen in the form of nitrate of soda per hectare is suggested. Liming the soil is not favorably regarded.

Japan clover, or Lespedeza, F. G. BUFORD (*Bien. Rpt. Tenn. Dept. Agr., 1907–8, pp. 141–153*).—An article is presented giving the history of Lespedeza and discussing its culture, values, and uses.

Jute in Bengal, N. C. CHAUDHURY (*Calcutta, 1908, pp. XII+195*).—This book discusses the history of the jute industry, the different races of the plant grown, the cultivation of the crop in detail, and the trade in the raw material and the manufactured products. Selected official papers on jute culture are reviewed, and miscellaneous topics bearing on jute culture are briefly noted.

Methods of seeding oats; drilling and broadcasting, A. N. HUME, O. D. CENTER, and L. HEGNAUER (*Illinois Sta. Bul. 136, pp. 299–312, fig. 1*).—The results of 3 years' trials at Urbana showed a net gain of 5.3 bu. of oats per acre from drilled over broadcast seeding. The general average of 2 years' trials at Sibley showed, regardless of the kind of preparation of the seed bed before sowing, a corresponding net gain of 3.6 bu. per acre, and 3 years' trials at De Kalb showed a general average yield in favor of drilling. The better results secured with the drill are considered due to regularity of stand, evenness of growth, and uniformity of ripening. It was further observed that clover seeded with oats in drills is less likely to be killed shortly after harvest than clover seeded with oats sown broadcast.

The time of cutting seed potatoes in its relation to yield, J. OSTERSPEN (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 18, pp. 283–286*).—The development of the yielding capacity of sets from large tubers cut lengthwise was practically the same as those of cuttings made in the same way from medium size tubers.

When the soil was dry and the weather cool, cutting the potatoes shortly before planting so that no water was lost from the cuttings produced no unfavorable results, but cutting 8 days before planting resulted in a loss of moisture in the prepared seed, and a reduction in yield was observed.

The effect of salt water on rice, G. S. FRAPS (*Texas Sta. Bul. 122, pp. 3–6, fig. 1*).—Rice plants were grown in pots 8 in. in diameter and 8 in. high, and treated with salt water of a concentration equal to 0.05, 0.3 and 1.0 per cent. The results secured showed that water containing 0.3 per cent or more of salt is dangerous to the crop, while water containing less may also be injurious. It is advised that the use of water containing 0.5 per cent or more of salt be avoided. Methods for the detection of salt in water are outlined.

The rice crop of 1907–8 in Indo-China, R. PIDANCE (*Bul. Écon. Indo-Chine, n. ser., 11 (1908), No. 72, pp. 261–283*).—The yields of the different provinces are given in tables and the behavior of the different varieties of rice cultivated is described.

Liquid distillery refuse as a fertilizer for beets (*Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr. [France], 1907, No. 36, pp. 25–29*).—The results of experiments along this line are reported and discussed.

The use of this material not only acted as a fertilizer but also supplied moisture to the growing crop. The beets treated with this substance were improved in form, being smoother and tapering more regularly than beets grown without this treatment. While the proportion of the crown to the rest of the beet was increased the tare in the crop was diminished by reason of the better form. The percentage of purity was also in favor of the beets fertilized with this liquid refuse. When applied at the rates of 500, 1,000, and 1,500 cubic meters per hectare (from about 53,530 to 160,590 gals. per acre) the results were very profitable.

Experiments with varieties of sugar cane, F. WATTS ET AL. (*Imp. Dept. Agr. West Indies, Sugar-Cane Expts. Leeward Isl., 1907–8, pt. 1, pp. 76*).—This is the customary report on varietal tests with sugar cane on the islands of Antigua and St. Kitts (E. S. R., 20, p. 639).

On the island of Antigua as plant canes, Sealy Seeding, B. 208, B 156, and B 306 headed the list among a number of varieties heading similar lists the year before. On the basis of their merits as plant canes Sealy Seedling, B 208, B 156, B 306, and possibly B 376, and D 109 are recommended for Antigua. Sealy Seedling, B 306 and D 109 have also rattooned well in these islands. Considering the behavior of the varieties both as plants and rattoons, Sealy Seedling is recommended for heavy soil in indifferent tilth, and B 208 for the best soils in first-class order. Among rattoon canes in St. Kitts, White Transparent came within the first seven at 6 different stations. Striped Singapore cane, Burke, D 74, Rock Hall, and B 147 are regarded as hardy canes.

Seedling and other canes in the Leeward Islands, 1907–8, F. WATTS ET AL. (*Imp. Dept. Agr. West Indies Pamphlet 56, 1909, pp. 55*).—A summary of the results of the cultivation of seedling and other canes at the experiment stations in the Leeward Islands in 1907–8 which have been noted above from another source.

Manurial experiments, F. WATTS ET AL. (*Imp. Dept. Agr. West Indies, Sugar-Cane Expts. Leeward Isl., 1907–8, pt. 2, pp. 22, dgms. 2*).—The experiments here reported are in continuation of work previously noted (E. S. R., 20, p. 639).

The use of nitrogen gave substantial increases in yield, which were greater, however, when phosphate and potash were used in conjunction with the nitrogen. In 2 experiments sulphate of ammonia furnishing 60 lbs. of nitrogen used alone caused a gain of 4.1 tons in one instance, and 3.9 tons of cane in another. In one experiment the increase from the use of 60 lbs. of nitrogen in the form of

nitrate of soda amounted to 4.2 tons per acre. When potash and phosphate were applied with sulphate of ammonia, the gains were greater than with the sulphate alone, but the additional increase was insufficient to pay for the potash and phosphate applied. Similar results were secured when potash and phosphate were applied with nitrate of soda, so that the results support the view that sulphate of ammonia or nitrate of soda applied alone is the more profitable practice. The results from the use of 40 and 60 lbs. of nitrogen per acre appeared inconclusive. Dried blood increased the yield by 3.2 tons per acre, but it was not remunerative. The highest yield of cane, 20 tons per acre, was secured in an experiment in which nitrogen and potash were applied without phosphate, but as other experiments show that potash has little influence, the gain is attributed chiefly to the nitrogen. The use of 2 cwt. of guano manure proved profitable, while 4 cwt. did not pay for itself in the increased yield.

As in previous years, it is again indicated that under average conditions of soil and rainfall, the use of either sulphate of ammonia or nitrate of soda for rattoon canes is most likely to be profitable. Under conditions promising moderate growth the use of about 2 cwt. of sulphate of ammonia or 2½ cwt. of nitrate of soda per acre is considered sufficient, but when there is a prospect of considerable growth, quantities increased to 3 cwt. of sulphate of ammonia and 3¾ cwt. of nitrate of soda are recommended.

Manurial experiments with sugar cane in the Leeward Islands, 1907–8, F. WATTS ET AL. (*Imp. Dept. Agr. West Indies Pamphlet 57, 1909, pp. 28, dgms. 2*).—This publication contains a brief summary of the results noted above.

Experiments with sugar cane, BRŒMER (*Bul. Écon. Indo-Chine, n. ser., 11 (1908), No. 71, pp. 235–239*).—Distance and fertilizer experiments are reported.

Planting sugar cane in rows 1 meter apart and 60 cm. (about 2 ft.) apart in the row gave better results than the native method of planting or placing the cane at greater distances. Wide planting favored the production of a larger number and a greater weight of stems per hill than did narrow planting.

In the fertilizer test the plat producing the best yield, 26,600 kg. of cane on 0.5 hectare (about 23.7 tons per acre), had received 500 kg. of soy bean cake, and 16,000 kg. of green manure per hectare. The green manuring consisted in plowing under *Dolichos albus*.

The action of soluble fertilizers on cane soils, C. F. ECKART (*Hawaiian Sugar Planters' Sta., Div. Agr. and Chem. Bul. 29, pp. 88*).—The effect of different fertilizer mixtures was studied at 4 substations. The mixtures applied furnished nitrogen, potash, and phosphoric acid at the rate of either 60 or 90 lbs. per acre. The interpretation of results is discussed and the data which form the basis for calculating the results presented in the bulletin are given in tables, together with rainfall and temperature records.

It is stated that in the average Hawaiian soil 7 per cent of the potash, 0.55 per cent of the phosphoric acid, and 24.4 per cent of the lime is soluble in a 1 per cent solution of aspartic acid. In the soil at Substation A, 13.3 per cent of the potash, 1.1 per cent of the phosphoric acid, and 15.6 per cent of the lime was soluble in a solution of aspartic acid, and the soil contained about one-half as much nitrogen as the average soil of the islands. Judging from the yield of plant and rattoon canes the essential elements apparently ranked in importance in the following order: Nitrogen, potash, phosphoric acid. The most suitable application used on this soil was the one containing 90 lbs. of nitrogen, 60 lbs. of potash, and 60 lbs. of phosphoric acid per acre. The average gain in available sugar from fertilizing the plant cane was approximately 46 per cent, and from fertilizing the rattoons 93 per cent. The approximate average gain from fertilizing both crops was 67 per cent.

At Substation B, 4.5 per cent of the potash, 0.19 per cent of the phosphoric acid, and 45.1 per cent of the lime was soluble in aspartic acid, and the soil contained nearly three times as much nitrogen as the average soil. At this station the elements ranked in the same order of importance as in the previously described test. The increases in potash and phosphoric acid from 60 to 90 lbs. were apparently injurious, but the efficiency of the mixtures in general was seemingly increased by extra amounts of nitrogen. At this substation the fertilization of the plant canes resulted in a loss of approximately 1 per cent, while the rattoons showed an approximate gain of 26 per cent.

At Substations C and D only 2.75 per cent of the potash, 0.035 per cent of the phosphoric acid, and 23.6 per cent of a comparatively small quantity of lime in the soil was found soluble. The nitrogen content was higher than in the average Hawaiian soil. At Substation C the soil was irrigated, while at D no water was applied. The relative order of the several elements was as follows: Nitrogen, phosphoric acid, potash. The most suitable mixture in the Substation C tests was the one containing 90 lbs. of nitrogen, 60 lbs. of potash, and 60 lbs. of phosphoric acid. The average approximate gain in available sugar, resulting apparently from fertilizing the plant cane, was 44.6 per cent; the gain with rattoons approximately 61.1 per cent; and the general average gain from the plants and rattoons 50.7 per cent. The soil of Substation D was identical with that of Substation C, and the treatment given the plants, aside from irrigation, was also the same. The relative order of importance of the several elements in the fertilizer mixtures was the same, but increases in nitrogen were less effective, and increases in phosphoric acid more effective, where the cane received the smaller amount of water. The application containing 90 lbs. of nitrogen, 60 lbs. of potash, and 90 lbs. of phosphoric acid is regarded as the most efficient for the unirrigated soil. The average approximate gain in available sugar for fertilizing plant canes was 45.6 per cent, as compared with 29.7 per cent for the rattoons. The average approximate gain for plants and rattoons was 39.9 per cent.

Tobacco transplanting and further treatment in the field, J. Van Leenhoff (*Transvaal Dept. Agr., Farmers' Bul. 27, pp. 3–14, figs. 7*).—This is a brief treatise on tobacco culture under Transvaal conditions.

The breeding and selection of tobacco, J. Van Leenhoff (*Transvaal Dept. Agr., Farmers' Bul. 28, pp. 7, figs. 3*).—This publication is a popular bulletin on the subject, and the advice given is for Transvaal farmers.

The culture of tobacco in Indo-China, F. Nacher (*Bul. Écon. Indo-Chine, n. ser., 11 (1908), Nos. 71, pp. 161–228, figs. 9; 72, pp. 299–346, charts 3*).—This article is an exhaustive description of the tobacco growing industry in Indo-China.

Statistics with reference to tobacco production are given and the varieties of native and introduced tobaccos are described. Improvements in the methods of culture are suggested with a view to obtaining a product capable of competing with the tobacco of Sumatra and the Philippines. The author believes that the climate and soil in Indo-China are adapted to the culture of the crop, and that by more scientific methods of cultivation the standard of quality may be raised.

Report on a test of varieties of wheat, R. S. Seton (*Univ. Leeds and Yorkshire Council Agr. Ed. [Pamphlet] 74, 1908, pp. 17*).—Six varieties of wheat were compared in 1908.

In yield of grain and straw and quality of grain Standard Red and Squarehead Master were the best red wheats. Browick Gray Chaff was superior in yield to these varieties but lacked in quality of the grain. Carter White Standup ranked first in yield with 63.5 bu. per acre. The straw of this variety

is very short in character, which eliminates to a large degree the danger of lodging. Squarehead Master, grown at Garforth for 10 years, shows practically no sign of deterioration. Duluth, the Canadian wheat now tested for 5 years, has not given promising results.

Experimental wheat fields, 1908–9, F. E. LEE (*Jour. Dept. Agr. Victoria, 7 (1909), No. 3, pp. 137–140, fig. 1*).—Comparative tests with varieties of wheat for the term of 4 years have shown that Federation is a better yielder than Dart Imperial, the difference in its favor for this time being from 2 to 3 bu. per acre.

Experiments with small-celled wheat plants, V. KOLKUNOV (*Reprinted from Khozyaistvo, 1908, No. 27–28; abs. in Zhur. Opuitn. Agron. [Russ Jour. Expt. Landw.], 10 (1909), No. 1, pp. 106, 107*).—Pot experiments were made with plants of various varieties of wheat differing in the size of the cells. The soil in the pots was kept low in humidity, the moisture being only 35 per cent of the total water holding capacity. It was found that the plants having larger cells, and which, therefore, evaporated more water, gave lower yields than the more xerophilous or those with smaller cells. With sufficient humidity the results were reversed.

Wheat selection, E. A. MANN (*Jour. Dept. Agr. West. Aust., 16 (1908), No. 4, pp. 262–271, pls. 12*).—The wheat improvement work in Australia is reviewed and a number of varieties developed by two different breeders are described and illustrated. The examinations made of these wheats showed that the strength of the flour is not always in proportion to the percentage of gluten but that it depends more upon the quality. For instance, Alpha containing 13.45 per cent of gluten did not produce so strong a flour as Huguenot containing only 9.48 per cent.

Koernicke's key for the classification of varieties of cereal crops, C. FLANKSBERGER (*Trudui Byuro Prikl. Bot., 1 (1908), 3–4, pp. 95–137*).

The breeding of agricultural plants, C. FRUWIRTH (*Die Züchtung der Landwirtschaftlichen Kulturpflanzen. Berlin, 1909, vol. 1, 3. ed. rev., pp. XX+335, figs. 33*).—This is the third revised edition of this volume (E. S. R., 19, p. 427), and is devoted to a general discussion of plant breeding.

The breeding of agricultural plants, C. FRUWIRTH (*Die Züchtung der Landwirtschaftlichen Kulturpflanzen. Berlin, 1909, vol. 2, 2. ed. rev., pp. XV+228, figs. 39*).—This second revised edition of this volume (E. S. R., 19, p. 427) treats of the breeding of the following crops: Corn, fodder beets, ruta-bagas, kale, carrots, chicory, rape, mustard, sunflowers, poppies, and a number of the more important grasses.

Agronomic habits of rootstock producing weeds, W. J. SPILLMAN and J. S. CATES (*Proc. Soc. Prom. Agr. Sci., 29 (1908), pp. 57–66, figs. 9*).—The studies given in this article relate to Johnson grass, Bermuda grass, and quack grass.

With reference to Johnson grass, it was found that rootstocks remaining in the soil at the end of the season send growth to the surface the next season, but do not themselves branch and send out other underground branches. When the new growth arrives at the surface, a new rootstock forms a crown, develops a new set of fibrous roots, and sends new rootstocks off into the ground. The formation of new rootstocks begins about at the time of blossoming.

It was also discovered that if the grass is cut back close to the ground, and not allowed to blossom during the season, the rootstocks remain slender and very near the surface of the ground, so that practically all of the underground growth can be turned up by a very shallow plowing. This method of treatment applied to quack grass and Bermuda grass will have similar results. The evidence secured is taken as showing that these rootstock grasses, when weakened

by constant pasturing or mowing on land remaining unbroken for several years, can be killed out by a minimum of cultivation.

The identification of several species of dodder by means of the differences in the nature of the seeds, H. VON GUTTENBERG (*Naturw. Ztschr. Forst u. Landw.*, 7 (*1909*), *No. 1, pp. 32–43, figs. 7*).—The characters of the more common varieties of dodder are discussed, and the structural differences in the seeds of *Cuscuta trifolii*, *C. europæa*, *C. epilinum*, *C. arvensis*, and *C. suaveolens* are described. A key to aid in the determination of the different species is arranged.

HORTICULTURE.

The etherization of plants for forcing purposes, W. STUART (*Trans. Mass. Hort. Soc., 1909, I, pp. 67–87, dgm. 1*).—In this paper the author considers the effect of ether, chloroform, and other substances upon plants under two general headings, namely, the physiological effect upon the tissues of a plant in an active growing condition, and the growth acceleration effect upon the plants in a state of rest. The experimental data on these subjects is reviewed, including earlier results secured by the author (E. S. R., 19, p. 235), and data are given on some anesthesia experiments conducted with lilacs and astilbe in 1907–8.

In summing up the author concludes that anesthetics and toxic substances such as alcohol, acetone, and other similar agents employed in small amounts, as well as nonanesthetic or nontoxic agents such as freezing, vacuum, and desiccation, all arrest growth and remove the moisture from the plant tissues in a very similar manner, and result in a more or less decided growth acceleration. Hot water appears to impart a distinct shock to the cell protoplasm and tissues, and acts also as a solvent in softening up the winter protecting scales inclosing the leaf and flowering buds, thereby hastening the winter forcing of shrubs. Taking all the factors which influence growth into consideration, it is concluded that thus far no one forcing substance may be said to be superior to all others although ether, because of its more general use, has come to be regarded as the best anesthetic to use in forcing plants.

A bibliography of the subject is appended.

On a simple process of forcing plants by warm baths, H. MOLISCH (*Sitzber. K. Akad. Wiss. [Vienna], Math. Naturw. Kl., 117 (1908), No. 1, pp. 87–117, pls. 2*).—This is a full account of the author's investigations along this line, abstracts of which have been noted from other sources (E. S. R., 20, p. 640).

Third series of investigations on the grafting of herbaceous plants, E. GRIFFON (*Bul. Soc. Bot. France, 56 (1909), No. 3–4, pp. 203–210, pls. 2*).—As reported in his previous work with Solanums and other herbaceous plants (E. S. R., 20, p. 751), the author finds that seedlings grown from previously grafted plants comport themselves in a manner similar to those grown from ungrafted plants. In a large number of new grafts made among solanaceous, leguminous, and composite plants which are here described no variations were noted which might be said to be caused by grafting.

[Horticultural progress at the Troupe Substation], W. S. HOTCHKISS (*Texas Sta. Bul. 121, pp. 3–6, 7–9, figs. 10*).—This consists of a summary of work conducted with orchard and small fruits and vegetables at the Troupe Substation since its establishment in 1902, including varietal lists of peaches, plums, apples, and persimmons which have proved most promising, together with notes on varieties of grapes least susceptible to mildew and rot, and which have continued to make good crops regardless of adverse weather conditions. The previously published report on varieties of strawberries (E. S. R., 16, p. 1081) has been verified by subsequent tests.

A two years' test with fertilizers for strawberries shows the absence of any benefit from the use of potash. Nitrogen and phosphoric acid seemed equally beneficial and when combined gave as good results as a complete fertilizer. A fertilizer consisting of 3 parts acid phosphate and 2 parts cotton-seed meal gave the best results.

Report of horticultural inspection, F. H. BALLOU (*Ohio Sta. Circ. 94, pp. 70, figs. 28*).—In the summer of 1908 the newly established division of horticultural inspection of the Ohio Station commenced a study of horticultural conditions, possibilities, and requirements in different parts of Ohio. This report comprises the results for 1908, and consists in substance of accounts of special crop adaptation and cultural methods in leading horticultural sections of the State, with suggestions relative to the development of lesser horticultural areas to meet the needs of local markets. New fruits originating in various parts of the State were examined, and descriptions are here given of the Linville and Dale View Dessert seedling apples, and the Fae, Mollie, and Buster Brown seedling strawberries. Two new seedling plums, an unusually large Concord grape, and 2 illustrations of bud sporting in apples are also reported, together with a brief account of the development of a disease resistant Loudon raspberry.

[Notes on ornamentals and fruits], L. R. WALDRON (*North Dakota Sta., Rpt. Dickinson Substa. 1908, pp. 33–36*).—A brief report on the condition of trees, shrubs and fruits planted on the Dickinson Substation grounds.

Report of the government horticulturist, R. A. DAVIS ET AL. (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 210–238*).—This is a general report on the work of the horticultural division and on the fruit industries in the Transvaal for the year ended June 30, 1908, together with the reports of the managers of the experimental orchards at Potchefstroom, Warmbaths, Ermelo, and Zeerust.

Annual report of the fruit experiment station, Shillong, for the year ending June 30, 1908, A. G. BIRT (*Ann. Rpt. Agr. Stas. East. Bengal and Assam, 1908, pp. 93–136*).—A report on various temperate and semi-tropical fruits being tested at the station, including notes on experiments in silkworm culture.

Cucurbitaceous fruits in Egypt, T. W. BROWN (*Jour. Roy. Hort. Soc. [London], 35 (1909), No. 1, pp. 31–35*).—Brief descriptive and cultural notes are given on the cucurbitaceous fruits grown in Egypt.

Fertilizer experiments with grapes, K. WINDISCH (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 25, pp. 406–409*).—Data are given on several chemical fertilizer experiments conducted in different vineyards in Wurttemberg. As indicated by the yields, complete fertilizers gave the best results. In vineyards which had been severely attacked by Peronospora a heavy application of fertilizer appeared to be of great value in bringing the vines back to a normal yield.

The Argentina grape and wine industries, R. PALENCIA (*In Censo Agropecuario Nacional la Ganadería y la Agricultura en 1908. Buenos Aires: Gort., 1909, vol. 3, pp. 235–265*).—A report on grape growing and wine making in the various provinces of Argentina, including statistical data for the year 1907.

Investigations on American grapes in Italy, F. PAULSEN ET AL. (*Bol. Min. Agr., Indus. e Com. [Rome], 8 (1909), Ser. A, No. 8, pp. 162–173*).—A report is here given of a study conducted under the direction of the Italian Department of Agriculture relative to the adaptability, resistance to disease, and fruitfulness of American varieties of grapes used for graft stocks in Italy.

On the application of bisulphid of carbon in mulberry culture, J. N. SIRKER (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 185–187*).—The effect of carbon bisulphid on the growth of the mulberry was compared with the effect of an extra dose of sodium nitrate.

Three plats of 16 square meters each (about 172 sq. ft.) were used in the experiment, each plat being first treated with a similar complete fertilizer. In the first plat 9 holes were made and 50 cc. of carbon bisulphid was poured into each hole 10 days before planting, the holes being afterwards filled in and water poured on the surface. In the second plat 40 gm. of sodium nitrate was applied as a top-dressing, one portion on May 3 and the other on June 1. The third plat served as a control. The results show an increased yield of mulberry leaves of 44 per cent on the bisulphid of carbon plat, as compared with no perceptible increase on the sodium nitrate plat.

The grafting of cacao, J. JONES (*Imp. Dept. Agr. West Indies Pamphlet 61. 1909, pp. 29, figs. 12*).—This pamphlet contains popular directions for grafting cacao plants, the subject matter being based on results secured from the author's work in grafting cacao at the Dominica Botanic Station.

Popular fruit growing, S. B. GREEN (*St. Paul, 1909, pp. 298, figs. 120*).—This is a text-book on fruit growing, being in a way a compilation of lectures on this subject given to the students of the University of Minnesota and which lectures are here revised and extended. Each chapter ends with suggestive questions on the matter presented and an appendix contains formulas for spraying and grafting, lists of fruits recommended for special typical States, rules for naming fruits, etc.

Arboriculture in Argentina, F. MAUDUIT (*In Censo Agropecuario Nacional la Ganadería y la Agricultura en 1908. Buenos Aires: Govt., 1908, vol. 3, pp. 271–296*).—This consists largely of notes on the more important native and exotic forest and fruit trees growing in Argentina, and also includes a number of exotics recommended for introduction into that country.

American landscape architecture, F. A. WAUGH (*Trans. Mass. Hort. Soc., 1909, I, pp. 105–118*).—A brief critical review of American landscape architecture from the colonial period to the present time.

Bulbs and their cultivation, T. W. SANDERS (*London [1908], pp. 223, pl. 1, figs. 66*).—This is a practical treatise on the cultivation and propagation of hardy, hothouse, and greenhouse bulbous and tuberous rooted plants, including lists of all the genera, species, and varieties considered worth growing in the British Isles.

Narcissus cultivation (*Bd. Agr. and Fisheries [London], Leaflet 224, pp. 10*).—A popular leaflet discussing the culture of narcissus both for the bulbs and for the blooms.

The introduction of the tulip, and the tulipomania, W. S. MURRAY (*Jour. Roy. Hort. Soc. [London], 35 (1909), No. 1, pp. 18–30, figs. 11*).—This is a paper on the introduction of the garden tulip into Europe during the sixteenth and seventeenth centuries.

FORESTRY.

Report of the conservator of forests, C. E. LEGAT (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 141–163*).—A progress report on forest operations in the government plantations and nurseries, including a financial statement for the year.

Progress report of forest administration in Baluchistan for 1907–8, S. SINGH (*Rpt. Forest Admin. Baluchistan, 1907–8, pp. VI+37*).—This is the usual progress report of operations in the state forests of Baluchistan, including a financial statement for the year. The more important data relative to areas, working plans, revenues, expenditures, etc., are tabulated.

The causes of timber line on mountains; the rôle of snow, C. H. SHAW (*Plant World, 12 (1909), No. 8, pp. 169–181, figs. 9*).—In this paper the author considers and discusses timber lines caused by wind and those caused by snow.

The results of fertilizer experiments with firs in North Ditmarsh, CLAUSEN (*Fühling's Landw. Ztg., 58 (1909), No. 8, pp. 295–305*).—The details are given of fertilizer experiments conducted in fir stands located in the North Ditmarsh forest circle, Holstein, Germany.

The Cembran pine (Pinus cembra) in Switzerland, M. RIKLI (*Neue Denkschr. Schweiz. Naturf. Gesell., 44 (1909), pts. 1, pp. XXXIX+455, figs. 51; 2, pls. 9, maps 21*).—This work, which is offered as a report on forest history and forest management in the Swiss Alps, consists of a monographic study of the Cembran pine in the various cantons of Switzerland relative to its history, range and distribution, associating trees, shrubs and flora, variability, site, soil, and climatic requirements, diseases and other enemies. An extensive bibliography of the literature consulted is given.

Part 2 consists of plates and maps accompanying the text in part 1.

The economic possibilities of the mangrove swamps of the Philippines, R. F. BACON and V. Q. GANA (*Philippine Jour. Sci., A. Gen. Sci., 4 (1909), No. 3, pp. 205–210*).—The authors discuss the possible utilization of the mangroves in the Philippine swamps in the manufacture of tanning materials, particularly of cutch. Analyses are given of samples of mangrove tan bark collected in different parts of the Philippines as compared with analyses of mangrove barks from Borneo.

On the question of wood preservation, F. SELDENSCHNUR (*Chem. Ztg., 33 (1909), No. 77, pp. 701, 702*).—A review of recent investigations relative to the efficiency of the acid constituents of the coal-tar oils used in the preservation of woods.

Difficulties in the practical work of creosoting timber, J. C. OAKES (*Engin. News, 62 (1909), No. 10, pp. 259–262*).—The author discusses difficulties which arise in creosoting timber by various processes and presents conclusions relative to ways of alleviating these difficulties.

A new process of coagulating the latex of Funtumia elastica, A. CHEVALIER (*Jour. Agr. Trop., 9 (1909), No. 98, pp. 225, 226*).—The process here described consists of adding to 30 parts of the Funtumia latex at normal temperature 1 part of the latex of *Strophanthus barteri* and then stirring the mixture for 5 to 10 minutes to obtain coagulation of the whole mass. The Strophanthus latex works to the surface of the coagulum and is washed off.

DISEASES OF PLANTS.

Bordeaux mixture, C. S. CRANDALL (*Illinois Sta. Bul. 135, pp. 201–296, figs. 8*).—A progress report is given of investigations on Bordeaux mixture and its effect on trees, particularly on the foliage. After an extended historical review, several phases of the subject are discussed, but all are to be subjected to further study. The chemical work reported in the bulletin was carried on by O. S. Watkins and Dr. H. S. Grindley.

In summarizing, the results thus far obtained show that the injury to the foliage of apple trees, following the application of Bordeaux mixture, is due to the use of impure or improper materials, carelessness in making the mixtures, or improper and ineffective applications. The chemical changes occurring in making Bordeaux mixture are still involved in obscurity and are being studied. The adhesiveness of the mixture depends very much upon the manner of making it and upon the character of the lime used. Variation in the proportions of copper sulphate and lime beyond certain well defined limits decreases adhesiveness. With lime of good quality, approximately equal parts of copper sulphate and lime give greatest adhesiveness. Experiments showed that there was a

decided advantage in maintaining an excess of lime upon the foliage, but this was best accomplished by subsequent applications and not by increasing the amount in the original mixture.

Two forms of leaf injury, the brown spotting and yellowing, are common accompaniments of spraying. The brown spotting is the more common injury, but not all of this is due to spraying, as similar effects are caused by frosts, winds, fungi, etc. Yellowing, when it appears in an epidemic form, is the more serious of the 2 diseases as the affected leaves are entirely destroyed. The causes of yellowing of apple leaves are obscure, but from observations extending over 5 seasons there appears to be no direct positive connection between spraying with well-made Bordeaux mixture and the yellowing of leaves. They do show, however, that improperly made mixtures may cause leaf yellowing, and similar results are obtained with simple solutions of copper sulphate. Much of the injury following spraying is attributed to abrasions of the epidermis made by insects and to infection by fungi preceding spraying.

Studies were made of the agencies through which copper deposited on the leaves becomes soluble and the manner in which the toxic action is communicated to the cell protoplasm. Laboratory experiments showed that the copper of Bordeaux mixture remained insoluble for long periods, but field experiments showed conclusively that under orchard conditions copper in small quantity becomes soluble very soon after deposition, and continues to appear as long as any of the mixture remains upon the leaves. The presence of lime in excess does not prevent solution of the copper. There was no evidence obtained to support the claim that solutions of copper occur through the agency of germinating spores nor through secretions from the leaf surfaces.

Experiments with solutions of copper sulphate showed that the apple scab fungus was quite resistant, the spores being slightly retarded in germination in solutions of 1:100,000, while a concentration of about 1:10,000 was necessary to prevent germination entirely. In this stronger solution some of the common molds grew quite readily.

The healthy bark of apple trees was found to be impermeable to Bordeaux mixture and to solutions of copper sulphate but copper sulphate is readily absorbed through wounds and promptly kills the leaves, which then become brown. Copper sulphate solutions were injected through roots and through holes in the trunks of trees, and uniformly resulted in browning of the leaves. The time required to give evidence of the injury varied with the strength of the solution and rate of transpiration, but it is usually short, varying from 25 minutes to a few hours.

The importance of rain and dew as agents causing spotting of foliage following the application of Bordeaux mixture was investigated, 2 trees being sprayed, after which one was protected from rain and dew and the other left exposed. This experiment was repeated during 3 seasons, and in each year the exposed tree was more or less injured by brown spots while the trees protected from rain remained free from injury. Several other experiments have shown that rain tended to promote injury to foliage upon sprayed trees.

Investigations with milk of lime and copper sulphate solution showed that it was the copper in solution that was the active agent responsible for the burning of the foliage. From comparisons between leaves sprayed with Bordeaux mixture and milk of lime, with Bordeaux mixture only, and with milk of lime only it would seem that the leaves on which the lime was used were distinctly larger than those not receiving it, and this suggests a stimulating action on the part of lime. Bordeaux mixture was found to have a decided influence upon the color of the leaves. When so coated apple leaves assumed a very dark green color that was retained even after the coating was almost entirely washed away,

while leaves coated only with the lime became somewhat darker in color but not so deep as is assumed under a coating of Bordeaux mixture.

There was no correlation found between the character of storms and the rate of solubility or the copper found in solution in water collected from sprayed trees.

Plant diseases; potato spraying, L. R. Jones and N. J. Giddings (*Vermont Sta. Bul. 142, pp. 103–115, figs. 4*).—An account is given of plant diseases observed in 1908, and also of the potato spraying experiments, which are in continuation of those previously reported (E. S. R., 20, p. 346).

The season was exceptionally dry and fungus diseases were not very prevalent. Insect injuries and physiological disturbances were more pronounced than diseases of fungus origin. Among the latter, notes are given on the early and late blight of the potato, potato leaf blotch, scab, and blackleg, together with brief notes on a number of orchard and garden crop diseases.

In continuation of the potato spraying experiments, plats were sprayed with Bordeaux mixture, comparisons being made with lime sulphur mixture. The lime sulphur plats gave a 37 per cent larger yield than did the unsprayed plats, while 2 applications of Bordeaux mixture resulted in a 67 per cent, and 4 applications in a 141 per cent, increase over the unsprayed plats. This season's work concludes 18 years' investigations on the value of Bordeaux mixture for the control of the diseases of potatoes. During that period the lowest gain has been 26 per cent and the highest 215 per cent, with an average of 92 per cent due to the application of the fungicide.

Notes on combating the smuts of cereals, O. Appel (*Mitt. Deut. Landw. Gesell., 24 (1909), No. 16, pp. 256–258, figs. 9*).—A description is given of the various smuts that attack cereals, with suggestions for their control. For the prevention of the loose smut of wheat and barley the author suggests the modified hot water treatment, which consists of a preliminary soaking for several hours in water at ordinary temperature, followed by short immersion in hot water, while for the other forms of smut soaking the seed in copper sulphate solution or in formaldehyde is to be preferred.

A new species of Tilletia, F. Bubák (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 6, pp. 545–549, fig. 1*).—A description is given of *Tilletia pančićii*, a new species recently discovered in the fruiting heads of barley in western Servia. Comparisons are drawn between this species and the other known species of that genus.

A note on Urophlyctis alfalfæ in California, Elizabeth H. Smith (*Science, n. ser., 30 (1909), No. 763, pp. 211, 212*).—The presence is noted in California of the crown gall of alfalfa, which occurs in Europe, but which so far as known has not been previously noted in this country. The galls are said to be numerous on the crown of the affected plant, and frequently occur an inch or two up on the stem. Although the galls are usually small, they may be 3 or 4 in. in diameter. The interior of the gall is composed of small, irregular cavities of hypertrophied tissue, the chambers being filled with masses of brown resting spores. A more detailed account of the disease as it occurs in California is to be published shortly.

Preliminary report on the anthracnose or pod spot disease of beans, C. W. Edgerton (*Louisiana Stas. Bul. 116, pp. 3–11, figs. 3*).—A brief description is given of the anthracnose or pod spot of beans due to *Colletotrichum lindemuthianum*, and the author offers suggestions for its control.

It is recommended that gardeners should grow seed for planting, the selections being made by examining the pods and rejecting all that show any traces of pod spot. In addition it is recommended that care be exercised in cultivating beans and in gathering them so that the plants be not disturbed when in a moist

condition. At this time the spores of the fungus are very readily carried from plant to plant, the disease being spread in this manner, while when dry there is little possibility of infection.

New facts concerning warty disease of potato, J. PERCIVAL (*Gard. Chron., 3. ser., 46 (1909), No. 1179, p. 79, fig. 1*).—This disease, which is due to *Chrysophlyctis endobiotica*, was first described in 1896. It is often spoken of as black scab, but the author thinks that warty disease would better describe it, as the tubers are not usually blackened as the name would indicate.

While examining tubers exhibiting this peculiar disease, the author was able to carry on some experiments which clear up some of the facts regarding the development of the parasite. When a cross section is made late in summer or autumn of the warty excrescence on a diseased tuber, large brown, thick-walled spores are seen embedded in the tissues beneath. Usually only one spore is present in each infected cell, although sometimes cells contain two. The diseased portion of the tuber, if left in the ground, becomes disorganized, and the spores are set free in the soil.

In the spring of the year the thick outer coat of the spore bursts and a large number of zoospores are liberated. These make their way through the soil by means of cilia, but this motion ceases in a short time and the zoospores then become amœboid and enter into the cells of any young potato plant with which they may come in contact. The formation of zoosporangia and the setting free of zoospores may be repeated indefinitely during the early summer, but later resting cells are produced which carry the organism over to the following spring. The parts of the potato attacked by the parasite are stimulated, rapid division of the cells near the point of infestation occurs, and an extraordinary proliferation of the tissues is effected, the new growth often resembling a piece of cauliflower.

Experiments on the combined treatment for Botrytis and Coniothyrium, G. DE ISTVÁNFFI (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), pp. 16, 17 [pub. 1908]*).—Experiments were conducted to control by simultaneous application of fungicides the two fungi mentioned above, the application being made toward the end of July. Mixtures of sulphur and copper, of sulphur, bisulphite of soda, and copper acetate, of sulphur and bisulphite of soda, and of lime and sulphur were used. The treatments were efficient in greatly reducing the Botrytis, and almost entirely prevented the occurrence of the Coniothyrium.

Contributions to the knowledge of Dematophera, G. DE ISTVÁNFFI (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), pp. 18–20 [pub. 1908]*).—A study was made of *D. glomerata* and *D. necatrix*, the first species being much more common than the second.

The presence of these fungi on grapevines is indicated by the leaves becoming crumpled, drying along their borders as if burned. Later the entire leaf becomes yellow and dries slowly, and sometimes new leaves are put out which remain small and resemble those of the gooseberry. The fungi, which attack the roots, develop in humid soils, particularly where there is poor aeration. Too great abundance of fertilizers, particularly barnyard manure, also favors the development of the parasites. Studies were made with the various spore forms, and descriptions are given of the different stages in the development of the fungi.

Prevention of "pourridié," A. SZIGETHI-GYULA (*Bul. Inst. Cent. Ampelol. Roy. Hongrois, 1 (1906), p. 16 [pub. 1908]*).—Experiments in a vineyard located in a rather moist situation showed that the application of lime at the rate of 2 kg., or of 10 liters of milk-of-lime, to a vine was efficient in preventing the pourridié.

Notes on the wintering of powdery mildew, G. DE ISTVÁNFFI (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), pp. 9–11 [pub. 1908]*).—A résumé is given of investigations begun in 1903 on the wintering of the powdery mildew.

The Oïdium form was found to persist in buds and on tendrils, and for its treatment the author recommends a late autumn spraying of the vines, the collection and destruction of the tendrils, and in the spring the removal of the young shoots which show the first spring attack. The spring treatment is to be supplemented by powdering with sulphur or a mixture with bisulphite of soda. This compound is said to act at a lower temperature than sulphur, which, it is said, is not efficient when the temperature falls below 17° C.

Experiments in the control of powdery mildew in the greenhouse, G. DE ISTVÁNFFI (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), pp. 14, 15 [pub. 1908]*).—A brief report is given of experiments for the control of the powdery mildew in graperies, in which the best results were obtained where a mixture of bisulphite of soda and sulphur was used. One-tenth per cent picric acid was without much effect and it badly burned the leaves.

Experiments on combating mildew, A. SZIGETHI-GYULA and L. DUPUIS (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), pp. 13, 14 [pub. 1908]*).—A brief report is given of experiments in which about 1,000 grapevines were treated for the prevention of mildew. The treatment included spraying and dusting with fungicides before the opening of the buds, or the application of fungicides later in the season. The preliminary treatment consisted of washing the vines with solutions of sulphate of copper, bisulphite of sodium, neutral copper acetate, and two trade preparations known as "Antispora" and "Result." The later sprayings were with Bordeaux mixture made by different formulas, Antispora, and Result.

The best results obtained were where Bordeaux mixture was used, and Antispora and Result were without much value for the control of the disease. Where the vines were dusted with neutral copper acetate the leaves remained green until the time they fell from the vines, while the check plants were completely defoliated by the beginning of September.

Experiments on the treatment of chlorosis of grapes, J. BERNÁTZKY (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), pp. 8, 9 [pub. 1908]*).—A summary is given of experiments for the treatment of chlorosis.

The author found that with the addition of 8 to 10 parts of carbonate of lime or carbonate of magnesium in 1,000 parts of a normal culture medium chlorosis would be produced in grapes, the leaves showing the characteristic symptoms and the roots suffering in their development. The oxids of lime and magnesium and the phosphate of sodium and tribasic potash produced similar effects even when used in 5 parts per thousand. Smaller quantities of carbonates had no effect on the production of the disease.

In treating chlorosis it was found that by neutralizing the medium with some form of acid the disease was prevented. This was particularly true when sulphate of iron, or better, the sesquichlorid of iron was used. If the nutrient solution did not contain iron, but was neutral or slightly acid, plants could remain in it for from 2 to 3 months without showing any indication of disease. The author says that in field treatment it is only necessary to neutralize the alkaline soils to secure immunity from the disease.

The falling of the flowers of grapes, E. PANTANELLI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), I, No. 8, pp. 406–411; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 560, II, p. 513*).—The author has investigated a case of the falling of flowers from grapevines, and finds that

healthy grapes and leaves contain considerably more carbohydrates and less of the various forms of nitrogen than the diseased grapes and leaves. The conclusion is drawn that the disease is due to the absorption of an excess of nitrogenous material from soils extremely poor in nitrogen and phosphoric acid.

Notes on Monilia disease of fruit trees, G. DE ISTVÁNFFI (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), pp. 29–39 [pub. 1908]*).—A study was made of the Monilia disease of fruit trees, particular attention being given to the attack of that fungus on cherries.

The effect of fog, soils, and susceptible varieties as contributing causes to the presence of this disease are described, after which notes are given on the hibernation of the fungus and its methods of attack. The spores were found to be quite resistant in their germination, but it is shown that when subjected to alternate cold and warm temperatures such as occur during winter seasons the vitality of a large proportion of the spores is destroyed.

In experiments conducted for the prevention of the Monilia, Bordeaux mixture, neutral copper acetate, and bisulphite of calcium were tested. As a result the author recommends the clearing out of all rubbish, cutting out dead limbs, and clearing away deposited gum during the winter, after which the trees should be sprayed before the opening of the buds with some of the fungicides mentioned above. In case of fogs or wet seasons subsequent sprayings should be made from time to time.

The bud-rot of the coconut palm, J. R. JOHNSTON (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 36, pp. 5*).—Attention is called to the bud-rot of coconut, a disease which has apparently been known in tropical America for a considerable time, and is believed to be of bacterial origin. The disease or similar diseases is widely distributed throughout tropical America, and possibly it may occur in the East Indies, Ceylon, and elsewhere.

The writer is preparing a full account of his investigations, and desires further knowledge regarding the occurrence of the disease, its relation to climatic and soil conditions, illustrations, etc.

The present status of the white pine blights, P. SPAULDING (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 35, pp. 12*).—This circular presents the results of investigations on white pine blight, and shows that there are several distinct diseases due to as many different causes. One of the most common forms of twig blight was due to the fungus *Septoria spadicea* n. sp., described by Mrs. Flora W. Patterson and Miss Vera K. Charles.

The most characteristic leaf blight is due to an undetermined cause, and was much less prevalent in 1908 than in previous years. Many partially affected trees have recovered, while no new ones became diseased. A twig blight caused by *Lophodermium brachysporum* is liable to occur if the weather is especially favorable to the fungus, but little damage from this disease is to be apprehended. The other diseases are all believed to be of transitory character and thus far have caused no permanent damage.

An eelworm in fern fronds (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1909, No. 6, pp. 243, 244, fig. 1*).—A description is given of *Aphelenchus olesistus* which has been recently noticed as occurring in fern fronds, causing conspicuous, well-defined brown stripes or irregularly shaped blotches on the fronds of various species of ferns grown under glass. The same nematode is said to cause brown patches on the leaves of begonias, chrysanthemums, coleus, gloxinia, etc. Dusting the plants with a mixture of tobacco powder and sulphur is said to be an excellent remedy for this pest.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

The transformations of the animal world, C. Depéret (*New York, 1909, pp. XVI+360*).—In the first part of the book the author gives a summary of the work of the principal authors regarding the evolutionist theory, including therein Darwin's precursors as well as his successors. In the second part he deals with the different processes of the variation and the extinction of species, together with the effects of migrations and the problem of the first appearance of life on the globe.

The origin of vertebrates, W. H. Gaskell (*London and New York, 1908, pp. IX+537, figs. 168; rev. in Science, n. ser., 29 (1909), No. 751, pp. 816–818*).—This work is reviewed by B. Dean.

Inoculating wolves (*Breeder's Gaz., 55 (1909), No. 20, p. 166*).—B. J. Peterson states that a large number of coyotes and jack rabbits severely affected with mange have been killed in Nebraska, and M. E. Knowles, Montana state veterinarian, that reports from southern Wyoming indicate that the mange of coyotes has spread to that section. H. Avare, Montana state game and fish warden, reports that due to a crusted snow about 200 deer were killed during the winter of 1908–9 near Ovando. Reports were received from other sections of the State to the effect that coyotes were killing deer at a rate that threatens their extincion.

Rabbit destruction, G. M. McKeown (*Agr. Gaz. N. S. Wales, 20 (1909), No. 4, pp. 331, 332*).—Directions for fumigating with carbon bisulphid and the mixing and use of rabbit poison.

Notes on the mammals and cold-blooded vertebrates of the Indiana University farm, Mitchell, Indiana, W. L. Hahn (*Proc. U. S. Nat. Mus., 35 (1909), pp. 545–581*).

Generic names applied to birds during the years 1901 to 1905, inclusive, with further additions to Waterhouse's "Index Generum Avium," C. W. Richmond (*Proc. U. S. Nat. Mus., 35 (1909), pp. 583–655*).—This list consists of some 200 names introduced as new during the years 1901–1905, inclusive, with about 350 others of earlier date, the majority of which are not recorded by Waterhouse.

An annotated list of the birds of Boulder County, Colorado, J. Henderson (*Univ. Colo. Studies, 6 (1909), No. 3, pp. 219–242, map 1*).—A list of 216 species, with a bibliography of 40 titles, is given.

"Owing to the differences in altitude, temperature, etc., the study of bird migrations is more complicated than in more level regions, there being a sort of vertical migration as well as the regular northward and southward movements. Valuable notes on vertical migration a few miles south of this county were made by Mr. T. M. Tripp."

List of injurious and beneficial insects and other animals received during 1908, J. W. Shoebotham (*Jour. Cooper Research Lab., 1909, No. 1, pp. 55–67*).—A list arranged by classes is given, in which the common and scientific names and the place of collection are included.

The metamorphosis of insects, P. Deegener (*Die Metamorphose der Insekten. Leipsic and Berlin, 1909, pp. 56; rev. in Science, n. ser., 29 (1909), No. 740, pp. 384–387*).—This work contains an analysis of the organization of the larva, and a consideration of the phylogeny of metamorphosis and of the significance of the pupal stage. The review is by W. M. Wheeler.

Recent work in insect behavior and its economic significance, W. B. Herms (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 223–230*).—A paper presented at the Watsonville, Cal., Entomological Conference, August 25, 1908.

The entomological writings of William Harris Ashmead, with an index to the new genera described by him, J. C. CRAWFORD (*Proc. Ent. Soc. Wash., 10 (1908), No. 3–4, pp. 131–160*).—Two hundred and sixty titles are listed. Of the 627 genera described by the author all belong to the Hymenoptera, except Eurymeloides and Polydontoscelis, which are Hemiptera.

Proceedings of the twenty-first annual meeting of the American Association of Economic Entomologists (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 201–220*).—This is a continuation of the proceedings previously noted (E. S. R., 21, p. 347).

Notes of the Year (1908) from North Carolina were presented by F. Sherman, Jr. (pp. 201–206). The chicken flea (*Xestopsylla* [*Sarcopsylla*] *gallinacea*) appeared for the first time, having been reported from Wilmington, where it was very abundant and proved troublesome to the human host. The strawberry weevil did serious damage in the spring in the southwestern part of the State. The cabbage louse is said to be a serious pest almost every spring. A cricket (*Anurogryllus muticus*) was reported for the first time as a source of injury to cabbage. The corn root aphis, commonly attended in the State by *Lasius aliena*, was the source of injury to cotton. The new cotton beetle (*Lupcrodes brunncus*) injured corn by eating off the silk and devouring the pollen from the tassels. The army worm, an account of which has been previously noted (E. S. R., 20, p. 1051), appeared in destructive numbers in August. An unusual number of complaints were received concerning the gloomy scale on red and silver maple. The elm-leaf beetle is destructive every year, chiefly in towns in the Piedmont or red-clay region between the elevations of 500 and 1,000 ft.

E. L. Worsham reported on the Insects of the Year in Georgia (pp. 206–210). The San José scale is still the most important insect pest in the State. The cherry scale was quite numerous, while the terrapin scale was found in a number of orchards and the oyster-shell scale and scurfy scale in a few. The West Indian peach scale was abundant in August. The gloomy scale is reported to be very common on oaks and maples and as killing maples in Atlanta. The plum curculio, while not as abundant as in previous years, badly infested a few orchards. In experiments conducted in combating the pest, 2 lbs. of arsenate of lead and 3 lbs. of lime to 50 gal. of water were used. "When we sprayed twice, 69 per cent of the fruit was sound; three times, 72 per cent of the fruit was sound, and where we sprayed four times, 75 per cent of the fruit was sound. On unsprayed trees there were 13 to 49 per cent of sound fruit; or on 7 unsprayed trees a general average of 30 per cent sound." Other insects of the year here noted are the Euonymus scale, *Aspidiotus tenebricosus*, *Ceroplastes cirripediformis*, citrus white fly, shot-hole borer (*Scolytus rugulosus*), peach-tree borer, peach-twig borer, codling moth, apple aphis, woolly aphis, Hessian fly, bollworm, new cotton beetle (*Luperodes brunneus*), red spider (*Tetranychus gloveri*), mole cricket (*Scapteriscus didactylus*), etc.

Notes on the Insects of the Year in Iowa were presented by R. L. Webster (pp. 210–212). The English grain louse (*Macrosiphum granaria*) which was common in Iowa the previous year was hardly noticeable during 1908. The spring grain aphis was also scarce. The wheat-head army worm (*Heliophila albilinea*) was very common over the State during July especially on timothy. The stalk borer (*Papaipema nitela*) was common during the summer boring in corn and oats. The clover seed caterpillar (*Enarmonia interstictana*) was present in clover fields in the vicinity of Ames, where *Aphis bakeri* was extremely common and caused some serious injury. The strawberry root worm (*Graphops*

nebulosus) was reported as causing serious injury in the eastern part of the State. The woolly aphis was not so common in the nurseries of the State as in previous years. *Aphis mali* became very numerous on apple stock in nurseries as well as on apples in orchards. The apple leaf hopper continued to be abundant in nurseries generally. The lesser apple leaf folder (*Acleris minuta*) caused serious injury to apple stock in two large nurseries in the southwestern part of the State. *Chionaspis pinifoliæ* is said to have been fairly common among evergreens in one of the large nurseries in southwestern Iowa but did no appreciable damage. The cherry slug (*Eriocampoides limacina*) stripped many cherry trees of their leaves in the vicinity of Ames. Early in the season, the box elder aphis (*Chaitophorus negundinis*) was very common on the box elder trees in various parts of the State. The buffalo tree hopper continued to be abundant on apple trees in orchards, causing serious losses to young apple trees every year.

An Outline of an Investigation into the Use of Hydrocyanic Acid and Carbon Disulphid Gases as Fumigants was presented by W. E. Hinds (pp. 214–218).

Entomological Notes for Missouri for the Season of 1908 were presented by Mary E. Murtfeldt (pp. 218–220). *Aphis mali* on apple and quince, *A. prunifolii* on the plum, and *Myzus persicus* on the peach are said to have appeared in such numbers that the blossoms were dwarfed and tarnished and the young leaves so distorted and crumpled that the trees had the appearance of being blighted.

Report on insects, C. O. Houghton (*Trans. Peninsula Hort. Soc.* [*Del.*], *22 (1909), pp. 38–43*).—Attention is called to a few of the more important insect pests of 1908 in Delaware. These include the tarnished plant-bug (*Lygus pratensis*), *Diabrotica vittata, D. 12-punctata, Aphis gossypii, A. forbesi*, Angoumois grain-moth (*Sitotroga cerealella*), San José scale, and plum curculio. Remedies for each are briefly considered.

[**Monthly reports of the Argentina agricultural pest commission**] (*Bol. Mens. Com. Defensa Agr.* [*Buenos Aires*], *1908, Nos. 9, pp. 8, maps 2; 10, pp. 9, maps 2; 11, pp. 10, pl. 1, maps 2; 12, pp. 10, pl. 1, map 1; 13, pp. 10, maps 2; 14, pp. 9, pl. 1, maps 4; 15, pp. 13, maps 4; 16, pp. 18, maps 4; 17, pp. 15, maps 2; 1909, Nos. 18, pp. 20, maps 3; 19, pp. 12, maps 3*).—In these monthly reports the status of the ravages of various pests and the work of combating them is presented. Particular attention is given to the injury done by locusts. Maps, which show the movement of swarms, localities invaded, etc., accompany the reports. Other pests reported are mosquitoes, ants, West Indian peach scale, army worm, tobacco worm, rabbits, etc.

Brown-tail moth, house fly, and mosquito, T. B. Symons (*Maryland Sta. Bul. 134, pp. 201–223, figs. 11*).—This is a popular account of *Euproctis chrysorrhœa, Musca domestica*, and *Culex pipiens*.

Some statistical observations on termites, mainly based on the work of the late Mr. G. D. Haviland, E. Warren (*Biometrika, 6 (1909), No. 4, pp. 329–347, fig. 1*).—"Although the young appear to hatch all alike and in certain species (*Termes natalensis*, for example) all are the offspring of one queen and king, yet the various asexual and sexual castes of a nest exhibit marked differences in their variabilities. The differences in the variability can not therefore be regarded as due to inheritance, but must be supposed to arise mainly through post-embryonic environmental influences. The sexual caste is much less variable than the asexual castes."

An orthopterological reconnoissance of the southwestern United States. I, Arizona. II, New Mexico and western Texas, J. A. G. Rehn and M. Hebard (*Proc. Acad. Nat. Sci. Phila., 60 (1908), pt. 3, pp. 365–402, figs. 9; 61*

(*1909*), *pt. 1, pp. 111–175, figs. 17*).—A study of the orthoptera, based upon field work during the summer of 1907 at stations extending from El Paso, Tex., and Albuquerque, N. Mex., to southern and northern California. In part 1 are presented the results of work in Arizona, and in part 2 the results of work in New Mexico and western Texas. A number of species are described as new to science.

A catalogue of American aquatic and semiaquatic hemiptera, G. W. KIRKALDY and J. R. DE LA TORRE BUENO (*Proc. Ent. Soc. Wash., 10 (1908), No. 3–4, pp. 173–215*).—This catalogue is intended to include everything published before July 1, 1908.

Observations on some hemiptera taken in Florida in the spring of 1908, E. P. VAN DUZEE (*Bul. Buffalo Soc. Nat. Sci., 9 (1909), No. 2, pp. 149–230, figs. 6*).—In this paper 354 species of hemiptera representing 203 genera taken during a 4 weeks' collecting trip in Florida in the months of April and May are listed. Two genera and 29 species are described as new to science.

The life history and habits of the woolly aphis, W. E. COLLINGE (*Jour. Cooper Research Lab., 1909, No. 1, pp. 28–37, figs. 3*).—An account of *Schizoneura lanigera* to which is appended a bibliography of 17 titles.

A new coccid of the genus Eriococcus, T. D. A. COCKERELL (*Proc. Ent. Soc. Wash., 10 (1908), No. 3–4, pp. 167, 168*).—The subspecies *Eriococcus quercus gilensis*, taken from twigs of *Quercus toumeyi* at Bellevue, Ariz., is here described as new to science.

A new gall-making coccid on Atriplex, T. D. A. COCKERELL and S. A. ROHWER (*Proc. Ent. Soc. Wash., 10 (1908), No. 3–4, pp. 169, 170*).—A coccid taken from *Atriplex canescens* at Las Cruces, N. Mex., and Trinidad, Colo., is here described as representing the new genus and species, *Atriplicia gallicola*.

A moth larva predatory upon the eggs of the bagworm, A. B. GAHAN (*Jour. Econ. Ent., 2 (1909), 3, pp. 236, 237*).—The larvæ of *Dicymolomia julianis* have been found to feed upon the eggs of the bagworm. In one instance two larvæ were found in the same bag. In every case where a full grown larva was found the eggs of the bagworm had been completely destroyed.

"When full grown the larva crawls out of the egg case and proceeds to spin a small cocoon at the tip or free end of the bag, within which it changes to a pupa $\frac{5}{16}$ in. in length and of a clear pale red color. That this predatory moth constitutes a considerable check on the bagworm in this locality can not be doubted when it is known that in some cases 25 to 30 per cent of the female bags were infested."

The normal habit of the species as heretofore understood was to live as a scavenger in the heads of the common Typha or cat-tail. The issuance as imagos as early as April or May precludes the possibility of the larvæ of this generation feeding on the eggs of the bagworm, and clearly indicates that there must be another host to carry it through the summer. A small chalcidid (*Leucodesmia typica*) reared from the bagworm is in all probability a parasite of this predaceous moth.

The larva of Lerina incarnata, H. G. DYAR (*Proc. Ent. Soc. Wash., 10 (1908), No. 3–4, pp. 162–164*).—The larva of this moth, a technical description of which is given, feeds upon *Asclepias pumila*.

Chironomid larvæ living in leaves, V. WILLEM (*Acad. Roy. Belg., Bul. Cl. Sci., 1908, No. 8, pp. 697–704, pl. 1*).—The author reports finding the larvæ of *Chironomides sparganii* n. sp., and another species in the leaves of *Sparganium ramosum*, the larvæ of *Pseetrocladius stratiotis* n. sp., in the leaves of *Strati-*

otes aloïdes, and the larvæ of *Chironomus nymphææ* n. sp., in the leaves of the water lily.

Observations on the life history and habits of Thereva nobilitata and other species, W. E. Collinge (*Jour. Econ. Biol., 4 (1909), No. 1, pp. 14–18, pl. 1*).—Technical descriptions are given of the life stages of *T. nobilitata*. The larvæ are said to prefer compact but sandy soils, in which they move about very actively. In wet and sticky soil they make use of the burrows formed by earthworms, and it was noticed that under these conditions they invariably formed a small chamber off one of the burrows. In one case one was observed feeding upon a small earthworm. Specimens were collected at the roots of currant trees and in various nurseries.

Contributions toward a monograph of the Scolytid beetles. I, The genus Dendroctonus, A. D. Hopkins (*U. S. Dept. Agr., Bur. Ent. Bul. 17, tech. ser., pt. 1, pp. 164, pls. 8, figs. 95*).—This contribution embodies the results of extensive, systematic investigations of the genus Dendroctonus carried on by the author during the past 17 years. The anatomical details of the imago, larva, and pupa, which are considered at length, are accompanied by numerous drawings. Synopses are given of the morphological and physiological characters of the adults, pupæ, and larvæ; also of the secondary sexual and gallery characters. Tables showing the distribution, host trees and the relation of species to host trees are included. Twenty-four species are recognized, of which seven are here described as new to science. Drawings of the egg galleries and larvæ mines and maps showing the distribution of the species accompany the account. A complete bibliography is appended.

The bark beetles (Scolytidæ) of the Iser Mountains, K. Neuwinger (*Mitt. Ver. Naturfr. Reichenberg, 38 (1908), pp. 7–12*).—Twenty-two species of bark beetles collected in the Iser Mountains are listed, with their food plants.

A new braconid of the genus Elasmosoma, T. D. A. Cockerell (*Proc. Ent. Soc. Wash., 10 (1908), No. 3–4, pp. 168, 169*).—*Elasmosoma vigilans* from Boulder, Colo., and evidently parasitic on *Formica subpolita*, is described as new.

Development of parasitic hymenoptera, F. Silvestri (*Bol. Lab. Zool. Gen. e Agr. R. Scuola Sup. Agr. Portici, 3 (1908), pp. 29–83, pls. 2, figs. 62; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 2, p. 182*).—Part 1 of this article has been previously noted (E. S. R., 19, p. 57). The author here gives an account of the development of *Ageniaspis fuscicollis*, *Encyrtus aphidivorus*, and *Oophthora semblidis*.

Quack grass, a host of the Hessian fly, P. Hayhurst (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 231–234*).—The author reports the discovery of the Hessian fly breeding in quack or couch grass (*Agropyron repens*) in an isolated field at Forest Hills, Mass., on November 8, 1908. He considers it improbable that the attack was accidental from neighboring grain fields.

The Tok-tokje (Psammodes sp.) as a grain pest, C. W. Mally (*Agr. Jour. Cape Good Hope, 34 (1909), No. 4, pp. 416–418, fig. 1*).—Brief notes are presented on *Psammodes reicheri*, the larvæ of which have been discovered injuring the base of stems of wheat. It is said to attack wheat, oats, barley, and corn.

Fertilization of clover, L. R. Waldron (*North Dakota Sta., Rpt. Dickinson Substa. 1908, pp. 7, 8*).—The agency of bumblebees in the fertilization of clover was studied with and without the bees and with a miscellaneous lot of insects collected in a clover field. The insects were in the cages 48 hours.

The heads in the cage without insects were pollinated by rolling between the palms. The results are tabulated as follows:

Seed production of variously treated clover blossoms.

Treatment.	Number heads studied.	Number flowers per head.	Number seed producing flowers per head.	Percentage of flowers per head producing plump seed.
Control	14	103.5	5.9	5.7
Hand rubbed	3	111.0	2.6	2.4
Field	10	134.0	83.6	62.4
Miscellaneous insects	70	93.5	2.2	2.3
Bumblebees	68	92.5	43.5	47.0

From these results the author concludes that bumblebees are responsible for about 95 per cent of the clover seed produced and that a small amount of clover seed is formed by natural self-pollination.

Corn weevils and other grain insects, R. I. SMITH (*North Carolina Sta. Bul. 203, pp. 5–27, figs. 16*).—This bulletin was prepared to furnish farmers with a more accurate knowledge of the various grain pests and methods of combating them. The author considers $2,285,450 a conservative estimate of their annual injury to corn and wheat crops alone in North Carolina.

The species considered are the rice weevil, granary weevil, dark meal worm (*Tenebrio obscurus*), yellow meal worm (*T. molitor*), cadelle, saw-tooth grain beetle (*Silvanus surinamensis*), Angoumois grain moth, Indian meal moth, Mediterranean flour moth, and meal snout moth (*Pyralis farinalis*). A consideration of the parasites and predaceous enemies, and preventive and remedial measures concludes the account.

The author found from experiments that the adult grain moths are killed by the vapor from a small quantity of carbon bisulphid, but that the grain beetles require a much greater strength. It appears to be even more difficult to kill the larvæ and pupæ of the rice weevil and Angoumois grain moth in their burrows.

Numerous fumigating experiments were made in a practically air-tight fumigating room, namely, one having a padded refrigerator style door and the inside walls covered with asbestos. In this room it was found that using 3 lbs. of carbon bisulphid to 1,000 cu. ft., fumigating for 21 hours killed practically all adult insects, but not over 70 per cent of the larvæ and pupæ of the Angoumois grain moth or rice weevil. The author concludes that carbon bisulphid at any reasonable strength can not be successfully used for fumigating grain in ordinary corn cribs, grain boxes, or store rooms.

The general entomological ecology of the Indian corn plant, S. A. FORBES (*Amer. Nat., 43 (1909), No. 509, pp. 286–301*).—"With the exception of the ear the whole plant lies open and free to insect depredation, and . . . is able to maintain itself in the midst of its entomological dependents only by virtue of its unusual power of vigorous, rapid, and superabundant growth. . . . The corn insects exhibit no structural adaptations to their life on the corn plant—no structures, that is to say, which fit them any better to live and feed on corn than on any one of the many other kinds of vegetation. . . . In short, in the entomological ecology of the corn plant we see nothing whatever of that nice fitting of one thing to another, specialization answering to specialization, either on the insect side or on that of the plant, which we sometimes find illustrated in the relations of plant and insects."

Some parasites of the cotton worm [in the West Indies] (*Agr. News [Barbados], 8 (1909), No. 179, pp. 74, 75, figs. 2*).—*Chalcis ovata* and *Sarcophaga trivittata* were bred from the cotton worm. A species of Spirochalcis was found to be parasitic upon *C. ovata*.

Some insects injurious to truck crops. Miscellaneous notes on truck-crop insects, F. H. CHITTENDEN (*U. S. Dept. Agr., Bur. Ent. Bul. 66, pt. 7, pp. 93–97*).—Arsenate of lead at a strength of 1 lb. to 20 gal. of water applied during the first week of June (in the vicinity of Washington, D. C.), followed by a second application a week later at a strength of 1 lb. to 15 gal. of water, is said to have controlled the asparagus beetle without injuring the plants.

The asparagus miner (*Agromyza simplex*) is reported to have infested asparagus at Antioch, Cal., and the asparagus beetle to have been abundant in that locality. As the miner was also found at Oakley, Cal., the author concludes that it is becoming generally distributed in the State. The asparagus miner is reported to be well established in the vicinity of Portsmouth, Va., and the source of severe injury at Concord, Mass.

The pea moth (*Enarmonia nigricana*), which has been known as a pest in Canada for several years, has been discovered for the first time in this country at Charlevoix, Mich.

A new western root maggot (*Pegomya planipalpis*), which was received from San Francisco, Cal., has been designated as the western radish maggot since Idaho is the type locality. Two natural enemies bred have been determined as *Aphærcta* sp. and *Polypeza* sp. Water-cress leaf-beetles (*Phædon æruginosa*), received from Halltown, W. Va., were parasitized by a fungus which has been tentatively determined as *Entomophthora sphærosperma*.

Notes are also given on injury by the water-cress sowbug (*Mancasellus brachyurus*) at Shippensburg, Pa., and Lexington, Va.

Western spread of the Colorado potato beetle, J. M. ALDRICH (*Jour. Econ. Ent., 2 (1909), No. 3, p. 235*).—The author reports the occurrence of the potato beetle in the Bitter Root Valley and in Flathead County, Mont., and in the town of Nez Perce, Idaho. The pest is said to have been established in the latter neighborhood for at least 2 years and seems to have spread considerably during the summer of 1908. It is pointed out that while the wet winters may account for its inability to maintain itself in Idaho this cause does not hold good in all the territory concerned.

The banded pumpkin beetle (Aulacophora oliverei), W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 20 (1909), No. 3, pp. 209–212, pl. 1*).—This species is considered the worst leaf-eating beetle that gardeners have to deal with in New South Wales, since it attacks all kinds of melons, cucumbers, pumpkins, and squashes. In 1908 it was the source of considerable injury to the fruit of the cherry. It is said that if the plants are dusted on the upper side with a plentiful supply of wood ashes, lime, or fine road dust the beetles will in most seasons leave the plants alone. Paris green dusted over the foliage will drive the beetles away.

The greenhouse thrips, H. M. RUSSELL (*U. S. Dept. Agr., Bur. Ent. Bul. 64, pt. 6, pp. 43–60, figs. 3*).—The author has made a study in Florida of the life history and means by which the greenhouse thrips (*Heliothrips hæmorrhoidalis*) can be controlled.

The thrips was found in 1907 to be the source of diseased conditions of crotons in a greenhouse at Orlando, Fla. In 1908 it was reported to be the source of injury to mangoes at Miami, Fla., to plants in greenhouses at San Luis Obispo, Cal., and to ornamentals in parks at Santa Barbara, Cal. The injury, so far as known, is confined to the foliage, no reports having been made of injury to blossoms. Since the species has been collected in widely distributed

places in this country, it is concluded that the pest is generally distributed in greenhouses throughout the United States.

Technical descriptions are given of the immature stages and the habits are discussed. On a few occasions specimens of the mite *Lælaps macropilis* have been found fastened to the dorsum of thrips. Details of fumigation and spraying experiments are reported. The remedies recommended include fumigating with nicotine papers, nicotine liquid extract, and hydrocyanic-acid gas, and spraying with water, nicotine liquids, and kerosene emulsion.

A bibliography of 27 titles is appended to the account.

Descriptions and life histories of two new parasites of the black currant mite, Eriophyes ribis, ADELAIDE M. TAYLOR (*Jour. Econ. Biol., 4 (1909), No. 1, pp. 1–8, pls. 2, figs. 4*).—A chalcidid, to which has been given the name *Tetrastichus eriophyes*, is said to be one of the most common and useful enemies of the black currant mite. Nine months are required by this chalcidid to complete its growth. The mite is parasitized by a minute fungus, which is described as new and named *Botrytis eriophyes*. The chalcidid larvæ are also killed by this fungus, as were nut mites (*Eriophyes avellanæ*) and birch mites (*E. betulæ*) that had been inoculated.

Lepidopterous enemies of the vine, L. VIVARELLI (*Rivista [Conegliano], 4. ser., 15 (1909), Nos. 2, pp. 27–31; 3, pp. 56–61; 4, pp. 80–85; 5, pp. 108–112; 6, pp. 123–129; 7, pp. 158–162; 8, pp. 177–184, figs. 15*).—A consideration of 13 species that are injurious to grapes in Italy.

Eggs and stages of the lesser apple worm, E. P. TAYLOR (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 237–239*).—Eggs were collected on June 19, 1908, at Olden, Mo., from the smooth surface of small apples and from the upper surface of apple leaves borne near fruit. Although at the time of collection these eggs were noted to be much smaller than others in the lot, they were taken to be those of the codling moth; upon breeding to maturity adults of the lesser apple worm emerged.

"The eggs upon apple trees, so far as observed, are deposited singly either upon the smooth surface of the forming apple or upon the upper or glabrous surface of the apple leaves. In this respect the oviposition habits of the moth upon apple is not unlike that of the codling moth. The eggs when freshly laid appear as small semitransparent yellowish-white spots, looking not unlike much flattened and very small drops of milk. In outline they are usually oval, fitting closely down upon the surface as convex disks. Specimens measured upon an average 0.68 mm. long by 0.53 mm. broad, which measurements show it to be a trifle more than one-half the size of the egg of the codling moth. . . .

"Larvæ under observation spent upon an average of 17 days in the fruit from the time they were seen to hatch until they emerged for pupation. From 21 to 23 days elapsed from the time eggs hatched to the emergence of the pink fusiform larvæ from the apple for cocoon spinning, and in one instance gave 24 days from the time the larva left the apple to the appearance of the adult moth, with an average actual pupal period of 12 to 16 days. The total life cycle of the lesser apple worm was found to be approximately the same as for the codling moth. . . . It is quite probable that eggs of *Enarmonia prunivora* were already being laid in the orchard late in May, at which time apples of standard winter varieties measured from 1 to 1½ in. in diameter."

The fact that the eggs of the lesser apple worm are laid a few days later than those of the codling moth emphasizes the importance of a spray at this particular time.

Notes on insects affecting the coconut trees in the Society Islands, R. W. DOANE (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 220–223*).—This is an account of

observations made of other insects while investigating the injury to coconut trees by *Aspidiotus destructor* (E. S. R., 20, p. 1053) in the Society Islands.

Hemichionaspis aspidistræ is said to rank next to *A. destructor* in numbers and probably in amount of damage done. Everywhere it is abundantly parasitized by a small chalcidid. *Lepidosaphes gloveri* is often very abundant on the bases of the older leaves, but as long as its attack is restricted to this part of the tree the damage done can not be very great. It also was everywhere badly parasitized. On the young tender unfolding leaves of many of the trees are to be found large colonies of *Pseudococcus pandani*. What seems to be the same species of the mealy bug occurs abundantly on the Pandanus.

Sphenophorus obscurus and *Calandra taitensis* are said to bore toward the base of the leaves, causing a resin-like exudation to flow from holes made by the larvæ. The larvæ of a small moth works on the underside of the leaflets, eating away the lower surface and causing the whole leaf to turn brown and die. Another small moth larva may prove to be of considerable importance on account of its habit of attacking the male flower buds as soon as they are exposed by the opening of the spathe. On some of the trees where male spikelets were in bloom the spike would be covered with two species of Œdemerids, *Ananca livida* and *A. collaris*, the former being the more abundant. They were feeding on the pollen and where a spike was badly attacked practically all the pollen was destroyed.

Brassolis isthmia, a lepidopterous insect highly injurious to coconut culture in the Panama Canal zone, H. F. Schultz (*Proc. Ent. Soc. Wash., 10 (1908), No. 3–4, pp. 164–167*).—This insect is said to have occurred in such numbers in 1906 as to defoliate the coconut trees on the Isthmus and necessitate their being cut down. The pest feeds at night, remaining in the nest during the day. While it can be controlled by the use of arsenate of lead, it is more easily accomplished by cutting down the nests. A dipterous parasite is said to help in its control.

Animals associated with the Hevea rubber plant in Ceylon, C. E. Green (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1908), No. 12, pp. 91–102*).—A brief account of the enemies of the Hevea rubber plant. There are said to be comparatively few animal enemies of this plant in Ceylon. It is to a very large extent self-protected from insect attack by the presence of the viscid caoutchouc-producing latex, which constitutes its great value.

Arsenical poisoning of fruit trees, W. P. Headden (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 239–245*).—A detailed account of experiments to which this article refers has been previously noted (E. S. R., 20, p. 452). The author concludes "that we must either find some other still more insoluble arsenical compound than any which has heretofore been used, or find some other substance with which to combat the codling moth, or eventually render our trees so short-lived as to curtail the profits of orcharding."

A note on the action of caustic soda, paraffin, and tar oils on fruit trees, S. Williamson (*Jour. Cooper Research Lab., 1909, No. 1, pp. 38–42, figs. 3*).—The author concludes that the fruit grower must exercise great care in the use of fluids containing caustic soda, paraffin, and tar oils and that the risk of damage to trees is too great to warrant their recommendation.

Control of insects and of plant diseases, C. D. Jarvis (*Connecticut Storrs Sta. Bul. 56, pp. 220–282, pls. 8*).—This bulletin discusses the principles of spraying and general preventives for insect and fungus pests, gives formulas of insecticides and fungicides, and directions for spraying the more important crops, describes the more important insect pests and fungus diseases, and briefly considers spraying machinery.

Instructions for spraying, W. H. CHANDLER (*Missouri Sta. Circ. Inform. 34, pp. 16, figs. 6*).—Directions for the preparation and use of insecticides and fungicides in combating insect enemies and fungus diseases of fruits.

Nursery and orchard inspection in Maryland, T. B. SYMONS (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 248–251*).—A description of nursery and orchard inspection as carried out in Maryland.

Nursery inspection in Minnesota, F. L. WASHBURN (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 246, 247*).—A brief account of the nursery inspection as conducted in Minnesota.

The transmission of disease by insects, F. C. WELLMAN (*Proc. Path. Soc. Phila., n. ser., 12 (1909), No. 1, pp. 36–43*).—This is a brief account of observations made in Africa by the author.

An introduction to methods of studying the morbid histology of disease-carrying insects, A. E. HAMERTON (*Jour. Roy. Army Med. Corps, 11 (1909), No. 3, pp. 243–249*).—A brief account of the technique.

Ticks. A monograph of the Ixodoidea, G. H. F. NUTTALL and C. WARBURTON (*Cambridge, 1908, pp. X+104+35, pls. 3, figs. 114*).—This work on the Argasidæ is part 1 of a monograph of the Ixodoidea, now in preparation. Practically all that has been published on the subject is said to have received adequate consideration. In the authors' opinion the genus Argas comprises 6 well-established species, while 4 others are doubtful. *Argas miniatus* is made a synonym of *A. persicus*. The genus Ornithodoros is represented by 11 well defined and 3 doubtful species. A complete synonymy and iconography are given for each species.

Both authors are responsible for the systematic portion, while the biological section was prepared by the senior author. W. F. Cooper and L. E. Robinson assisted in collating the literature on the subject. In the text the Harvard system of references is adopted, the year and page of the authors' papers being added after their names. A bibliography of about 300 titles printed on one side of thin paper, suitable to cut and paste upon index cards, is appended. Many text figures and plates accompany the work.

Three new ticks from the United States, N. BANKS (*Proc. Ent. Soc. Wash., 10 (1908), No. 3–4, pp. 170–173, figs. 6*).—*Dermacentor modestus* from a horse at Mountain Home, Idaho, and Prescott and Olympia, Wash.; *Aponomma inornata* from a dog at Corpus Christi, and a rabbit at Victoria, Tex.; and *Ixodes texanus* from a raccoon in Live Oak County, Tex., are described as new.

Some host relations of ticks, W. A. HOOKER (*Jour. Econ. Ent., 2 (1909), No. 3, pp. 251–257*).—Forty-one species of ticks representing 10 genera are said to occur in the United States and Alaska. *Amblyomma dissimile*, a Mexican species, is reported to have been collected from iguanas at Brownsville, Tex. The new species *Aponomma inornata* which has been collected from the dog and rabbit in Texas is the first representative of this genus discovered in the United States. In the larval stage *Amblyomma tuberculatum* has been found to attach to mammals and birds. The nymphs are commonly found on the gopher tortoise and were experimentally engorged upon a bovine, while the adults apparently attach to cold-blooded animals only. Other species of which the host relations are noted are *Amblyomma americanum*, *Hæmaphysalis leporis-palustris*, *H. chordeilis*, *Ixodes scapularis*, *I. cookei*, *I. ricinus*, *Dermacentor venustus*, *D. variabilis*, and *D. marginatus*.

Bots of horses (*Agr. Gaz. N. S. Wales, 20 (1909), No. 3, pp. 203–208, figs. 6*).—A description is given of the biology of *Gastrophilus equi* and *G. hæmorrhoidalis*. Preventive measures and curative treatment are briefly considered.

Note on aphids attacking sheep, cattle, and horses, W. E. COLLINGE (*Jour. Cooper Research Lab., 1909, No. 1, pp. 51, 52*).—The author quotes the following

notes received from a correspondent at Sydney, Australia, concerning this pest, a report of which by Gurney has been previously noted (E. S. R., 20, p. 654): "This pest makes its appearance in the springtime when the trefoil clover is beginning to flower, and a drooping, showery season, producing a luxuriant growth of clover, causes the pest to become a terrible scourge, attacking not only sheep, but cattle and horses."

As far as is at present known the pest concerned is regarded as a purely clover aphis, resembling very much the rose and cabbage aphis, particularly the latter. This pest is, however, black in color, while the ordinary aphis is a slaty-green color.

Lucilia as a parasite, E. HESSE (*Biol. Centbl., 28 (1908), No. 23, pp. 753–758*).—Several cases are noted where live and newly dead toads were found to have larvæ of Lucilia developing in the head region. The author observed *Lucilia cæsar* depositing eggs in a living nestling of the mistle-thrush (*Turdus viscivorus*) that had fallen from the nest.

Bee keeping in Massachusetts, B. N. GATES (*Massachustts Sta. Bul. 129, pp. 3–31, figs. 2*).—This is a reprint of Bulletin 75, part 7, of the Bureau of Entomology of this Department, previously noted (E. S. R., 21, p. 357).

Lac and lac cultivation, D. N. AVASIA ([*Indian Forest Dept.*] *Pamphlet 4, Forest Econ. Ser. 1, pp. 10*).—A lecture delivered at the Imperial Forest College at Dehra Dun. Lac is described as a resinous incrustation formed by the scale insect *Tachardia lacca* on twigs of certain trees. *Schleichera trijuga* and *Butea frondosa* are said to be the trees most suitable for lac production.

Universal camera bracket, E. VIALL (*Sci. Amer. Sup. 67 (1909), No. 1740, p. 292, figs. 4*).—Plans and photographs are presented of a simple camera bracket that has been devised for use in photographing objects on the ground. This bracket combines the features of being universal, rigid, and cheap, and is said to be far superior to the ordinary ball-and-socket joint universal camera holder. This bracket is apparently suited to the use of the entomologist in field work.

FOODS—HUMAN NUTRITION.

Linnaeus' dietetics, A. O. LINDFORS (*Uppsala Univ. Aarsskr. 1907, Linnéfest Skr. 2, pp. 167, pl. 1*).—This translation was made from Linnaeus's original manuscript. There is a brief introduction by the translator.

Sugar as food for man, J. TRIBOT and F. DUPONT (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 5, pp. 113–119*).—Data on the dietetic use of sugar are summarized and discussed.

The harmful effects of acetanilid, antipyrin, and phenacetin, L. F. KEBLER, F. P. MORGAN, and P. RUPP (*U. S. Dept. Agr., Bur. Chem. Bul. 126, pp. 85*).—In order to obtain reliable information regarding the harmful effects of acetanilid, antipyrin, and phenacetin an investigation was undertaken to ascertain as far as possible their status as toxic agents. To this end an inquiry was addressed to medical practitioners in the United States with regard to their experience with the drugs and a study was made of the medical literature of the subject. The data summarized show that these drugs are prescribed by the majority of observers less frequently than formerly, the reasons given being in most instances their toxic and particularly their depressing effect.

The bulletin also contains a summary of the results of an inquiry regarding the importance of the ill effects of these agents, which was conducted by the British Medical Association.

Chemical composition of some Sudan grains, W. Beam (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 401–411*).—A large number of analyses are reported of different varieties of sorghum, Indian corn, teff (*Poa abyssinica*), millet, rice, fenugreek, beans, corn, and of other grains and oil-bearing seeds.

Milling and baking tests with wheat, L. R. Waldron (*North Dakota Sta., Rpt. Dickinson Substa. 1908, pp. 24–26, pl. 1*).—Milling and baking tests carried on under the direction of E. F. Ladd are reported with the following varieties of wheat: Kahla, an Algerian durum with black chaff and beards; Gatineau, a Canadian Red Fife and Wild Goose hybrid; two Kubankas; Galgalos, a velvet chaff "hard" wheat; and Girka, a Russian wheat that very closely resembles Fife. All the wheats were heavy, ranging from 60.5 to 64.5 lbs. per bushel, and the yield of flour was high in every case, all giving an average corrected percentage of 70 except Girka. "In yield of patent flour, the Kahla wheat leads with a percentage of 59.9. The percentage of the 'clear' flours and the bran are correspondingly low. The Gatineau is apparently with the durums as a milling wheat. The durums are apparently much superior in milling qualities to the two 'hard' wheats."

A study of the gluten of the different flours showed that in the case of the durum wheats the expansion was decidedly lower than with the hard wheats and that the Gatineau was intermediate in this respect. The Girka flour showed a high expansion and in the author's opinion "ought to make very 'light' bread. The Galgalos loaf fails to 'stand up' in the oven."

The baking tests were made in comparison with a standard flour. The results reported indicate "that a less amount of the durum is required to make a loaf of a certain weight than is required of the hard wheat flour. From the standpoint of the baker, the durum flours ought to be much more preferable. The Girka flour shows its ability to make a loaf, very nearly as large as the 'standard.' . . . The Kahla and Kubanka loaves are but three-fourths as large as the standard loaf, of the same weight. The Kahla is considerably superior in the number of loaves it produces per bushel of wheat and per barrel of flour. The Girka is at the bottom of the list. The Gatineau shows up very favorably, both as a milling and as a bread wheat. Unfortunately the trials for two seasons do not indicate that it yields as well as the Girka or Kubanka."

Report of the Local Government Board on "facing" and other methods of preparing rice for sale, J. M. Hamill (*Local Govt. Bd. [Gt. Brit.] Rpts. Insp. Foods, 1909, No. 8, pp. 21*).—An investigation was undertaken into the conditions under which rice is prepared and sold, with a view to securing data regarding the extent to which "facing" and other treatment of rice is practiced in addition to the ordinary milling.

Millers generally polish rice, according to the author, talc or kindred substance being used to impart a high polish or glaze to the grain. Furthermore, pigments of various kinds such as, most commonly, ultramarine blue, but sometimes Prussian blue, indigo and anilin dyes may be employed to modify the yellowish color of rice, while oil, either vegetable oil such as arachis oil, or some mineral oil, is used to increase its translucency. A sample of the talc used in "facing" rice was analyzed, and analyses of extraneous mineral matter from the surface of rice by P. A. E. Richards reported. Of 509 samples of rice examined 86 were unpolished, 69 lightly polished, and 354 highly polished.

According to the author, "there seems to be no reason for anticipating that injurious results are likely to follow the use of polishing materials if they are used in such a way that only comparatively small amounts, such as shown in the majority of the analyses [reported] . . . remain in the rice.

"At the same time, the presence in a food like rice of comparatively large quantities (such as 1 to 2 per cent) of insoluble and possibly irritating mineral matter might in some circumstances be definitely prejudicial to health, especially as this food is often given in considerable quantities to children and invalids.

"The quantity of mineral matter can, of course, be reduced by carefully washing the grains with cold water before cooking, but it is not desirable that the consumer should have to rely on this means of reducing the foreign matter which has been added. . . .

"The small quantity of oil employed in dressing rice appears to have no effect, but it should be said on the other side that, on general principles, use of a mineral oil should be avoided in any article of diet.

"With regard to coloring matter, the amounts used in rice are small, and no objection in respect of risk to health need arise provided that colors are used, the reasonable fitness of which for dietetic purposes has been assured. . . .

"It seems desirable that the quantity of adventitious mineral matter should be determined by public analysts to whom rice samples are submitted under the Sale of Food and Drugs Act, and that the analyst's certificate should direct attention to samples in which the proportion of mineral matter exceeds . . . 0.5 per cent."

In the appendixes are given analyses by P. A. E. Richards of various specimens of unglazed rice to which known proportions of talc had been added, and experiments by S. B. Schryver with regard to the digestibility of oiled rice, mice being used as subjects.

It appears "that oil has no influence on the rate of diastatic digestion, the results only varying as a rule by less than 2 mg. from a mean."

The occurrence of asparagin in young pear fruits, P. Huber (*Schweiz. Wchnschr. Chem. u. Pharm., 47 (1909), No. 26, pp. 401, 402*).—Determinations of asparagin in young pears are reported.

Fruit acid in pineapples, R. Kayser (*Ztschr. Öffentl. Chem., 15 (1909), No. 10, pp. 187, 188*).—According to the author's determinations 2 samples of pineapple juice contained respectively 63 and 60 gm. citric acid per 100 cc. Tartaric and malic acid were not present. Very little of the citric acid was in combination with bases.

Pickled tea (*Trop. Agr. and Mag. Ceylon Agr. Soc., 4 (1909), No. 5, pp. 461–526*).—Information is given regarding a fermented product made from tea leaves which is used in Burma and neighboring regions. The article is quoted from *Capital*. See also a previous note (E. S. R., 21, p. 64).

Powdered meat. Its food and therapeutic value, P. Lassablière (*Arch. Méd. Expt. et Anat. Path. [Paris], 21 (1909), No. 3, pp. 299–323*).—A fuller account of investigations previously noted from another source (E. S. R., 19, p. 358).

Changes in cold storage and frozen meat, J. E. Richelet (*Rev. Facult. Agron. y Vet. La Plata, 2. ser., 5 (1909), pp. 226–236*).—The nature of slime, brown spot, and mold, their prevention, and similar questions are taken up.

Changes in cold storage and frozen meat, J. E. Richelet (*Bol. Min. Agr. [Buenos Aires], 10 (1909), No. 4, pp. 282–289*).—A less extended article than that noted above.

What is diseased meat and what is its relation to meat inspection? T. Smith (*Amer. Jour. Pub. Hyg., 19 (1909), No. 2, pp. 397–411*).—Quotations from the author's summary follow:

"There are few animals either ideally sound or wholly free from disease germs or parasites. [The author, however, does not consider that these minor

departures from normal, which are the most numerous, are harmful or objectionable with good meat inspection service in operation.]

"The line to be drawn between normal and suspicious or infected meat is not absolutely fixed, but depends on the nature and stage of the disease process.

"In very few diseased conditions would the thoroughly cooked meat if eaten produce disease in man.

"Animals affected with certain diseases are rejected in toto because the handling may infect man or disseminate the disease. Animals affected with other diseases are rejected partly because our general standards of healthy meat are relatively high, partly because such diseases may be disseminated by the meat and infect other animals.

"The proportion of harmless meat from diseased animals excluded from consumption in the future will probably depend more or less on the relative scarcity of meat. With the shrinking of supplies we may eventually approximate the regulations now in force in Germany which permit a larger freedom in the use of meat from diseased animals than we do.

"Proper inspection demands well-trained inspectors and these are most economically employed in large public abattoirs.

"To utilize our meat products most efficiently they should be classified and meat from certain diseased animals now rejected entirely should be sold under suitable restrictions after sterilization."

Public slaughterhouses (Scotland), F. DITTMAR (*Glasgow: Local Govt. Bd., 1908, pp. 82*).—A report is presented on the conditions prevailing in Scotland in respect to the provision of public slaughterhouses by local authorities, and as to the methods of meat inspection conducted by such organizations. On the basis of data collected suggestions for improvement are made.

Food legislation (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), No. 5, pp. 607–623*).—A summary of recent food legislation in Germany, England, the United States, and other countries.

Notices of judgment (*U. S. Dept. Agr., Notices of Judgment 69–81, pp. 23; 82, pp. 7; 83–90, pp. 19*).—These notices of judgment have to do with the misbranding of rye flour, canned peas, lemon extract, canned cherries, vinegar, maple sirup, canned tomatoes, water, tomato catsup, salad oil, drug preparations, wine, baked beans and tomato sauce, saltpeter, and evaporated apples; the adulteration of milk and oats; and the adulteration and misbranding of pepper.

Health regulations of the Prussian States in the year 1907 (*Ztschr. Öffentl. Chem., 15 (1909), No. 10, pp. 188–195*).—A brief account of the nature of the pure food work of the Prussian inspection stations.

Food standards in the colony of Victoria (*Brit. Food Jour., 11 (1909), Nos. 124, pp. 58–61; 125, pp. 77, 78; 126, pp. 97–99*).—The official food standards adopted in Victoria are quoted.

A quarterly report of progress in food chemistry, H. ZUCKER (*Pharm. Ztg., 54 (1909), Nos. 48, pp. 470, 471; 49, pp. 479, 480*).—A digest of analytical and other data regarding the chemistry of bread, milk, tea, coffee, coco, water, and other products for the first quarter of the year 1909 is given.

Progress in the examination of foods, condiments, fats, and oils. UTZ (*Österr. Chem. Ztg., 12 (1909), Nos. 5, pp. 59–62; 6, pp. 74–77; 10, pp. 130–132*).—This is a digest of data regarding the examination of water, milk, wine, fats, oils, bakers' goods, meat products, honey, preservatives, and other such goods.

Food analyses No. 23, E. H. S. BAILEY and H. L. JACKSON (*Bul. Kans. Bd. Health, 5 (1909), No. 5, pp. 100–105*).—Data are given regarding the analyses of a number of samples of sirups, extracts, vinegar, pickles, and miscellaneous foods.

Vinegar and artificial vinegar, WITTE (*Ztschr. Öffentl. Chem., 15 (1909), No. 10, pp. 181–187*).—A discussion and digest of data.

The composition, alcohol content, and nonalcoholic constituents of brandies and cognacs, X. ROCQUES (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 5, pp. 108–110*).—Data are reported regarding the composition of these goods.

Brandies and other alcoholic beverages, C. GIRARD (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 5, pp. 90–94*).—A report and discussion of analytical data.

Cognacs, J. M. GUILLON (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 5, pp. 111, 112*).—A note on the analysis of such goods.

Analyses of wines from the Baranya district (*Bul. Inst. Cent. Ampélol. Roy. Hongrois, 1 (1906), tables 3 [pub. 1908]*).—A report in tabular form and without discussion of analyses of 75 samples of wines.

Fraud in the bottled water industry, E. BONJEAN (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 3, pp. 45–52*).—The systematic examination of mineral waters is recommended with a view to determining their genuineness, and the legal aspects of the matter are considered.

Lead in culinary utensils and tinned goods, PADÉ and KOHN-ABREST (*Rev. Soc. Sci. Hyg. Aliment., 7 (1909), No. 5, p. 120*).—A note on lead in enameled and tinned utensils and its permissible limits.

Missouri Home Makers' Conference Association (*Missouri Bd. Agr. Mo. Bul., 7 (1909), No. 3, pp. 70, figs. 3, dgm. 1*).—A report of the business transacted at the second annual meeting of the Missouri Home Makers' Conference Association, Columbia, Mo., January, 1909, is presented, with papers, including among others The Typical Rural Home, Its Possibilities, and Obligations, by Mrs. H. C. Harvey; What the State May Do for the Farmers' Wives, and Household Conveniences, by Martha Van Rensselaer; Well-Balanced Meals, by Edna D. Day; Broiling and Roasting of Meat, by Louise Stanley; and How to Can Fruits and Vegetables on the Farm, by Mabel E. Moore.

How to cook vegetables, OLIVE GREEN (*New York and London, 1909, pp. V+644*).—An extended compilation of methods of preparing vegetables of different sorts.

Mechanical kneading machines, RINGELMANN (*Bul. Soc. Nat. Agr. France, 69 (1909), No. 5, pp. 411–419*).—A study of kneading machines with reference to the amount of power required.

Price of foodstuffs in France, É. LEVASSEUR (*Rev. Écon. Internat., 6 (1909), II, No. 2, pp. 205–255*).—Data were collected in 70 high schools regarding the fluctuations in the price of foodstuffs during the last 25 years in different regions of France. The statistical data reported are discussed.

[Cost of food], KEENE (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1909, No. 4226, pp. 7–20*).—Data are given regarding the price of food, wages, and hours of labor, and similar questions in the consular district of Genoa in 1908.

A study of malnutrition in the school child, E. M. SILL (*Jour. Amer. Med. Assoc., 52 (1909), No. 25, pp. 1981–1985*).—On the basis of 210 cases of malnutrition in school children in New York City which have come under his observation, the author discusses the general subject and makes suggestions for treatment. Of the children under the author's observation showing malnutrition, 83 per cent practically depended for their diet on bread with tea or coffee.

In the treatment of malnutrition it is pointed out that mothers must be instructed "in the schools and clinics, either by word of mouth or printed directions, as to what foods are best for the growing child, which are the most nutritious and healthful for the money, the best way to cook different foods, what articles of diet to avoid, and the necessity of plenty of fresh air and sunlight and cleanliness. Warm clothing is a necessity.

"These children should be given a highly nutritious diet; that is, foods that contain a large amount of proteid material."

The dietary which he states he found to be most valuable consisted of "milk (a quart a day), coco, eggs, red meat (once a day), fowl, fish, bread and butter, and cereals, such as oatmeal. . . . Farina, hominy, corn meal, rice, pure olive oil, and cream should also be given if possible, with vegetables, such as spinach, stewed tomatoes, stewed corn, cauliflower, baked and creamed potatoes, purees of beans or peas, and baked beans, and fresh fruit, such as oranges, pears, apples, raw and baked and in the form of apple sauce, and stewed prunes."

The fluids of the body, E. H. STARLING (*London, 1909, pp. VIII+186, figs. 13*).—In this volume the author has gathered together a number of lectures delivered at different times. The subjects taken up include the physical properties of protoplasm, the osmotic relationships of cells, the intake of fluid, the exchange of fluids in the body—the production of lymph, the absorption of the interstitial fluids, the output of fluid, and the fluid balance of the body.

Can nitrogen equilibrium be attained with either zein or gliadin as the sole proteid in the food? V. HENRIQUES (*Ztschr. Physiol. Chem., 60 (1909), No. 2, pp. 105–118*).—With zein it was not possible to attain nitrogen equilibrium though the loss was less than with nitrogen-free food. With gliadin, nitrogen equilibrium was attained and gains were made provided the amount supplied was sufficiently large. The experiments were made with rats.

Experiments to refute the theory that the small intestine aids in the formation of glycogen from dextrose, K. GRUBE (*Arch. Physiol. [Pflüger], 127 (1909), No. 8–10, pp. 529–532*).—From his experimental data the author concludes that the liver builds glycogen directly from dextrose.

The metabolism of man during the work of typewriting, T. M. CARPENTER and F. G. BENEDICT (*Jour. Biol. Chem., 6 (1909), No. 3, pp. 271–288*).—By means of a respiration calorimeter the carbon dioxid and water output, the oxygen absorption, and the heat production were studied both while the subject was engaged in typewriting and while at rest.

Under the experimental conditions, "it seems reasonable to assume that the work of writing some 1,500 to 1,600 words per hour on the typewriter results in an increase over the resting metabolism of some 10 to 14 gm. of carbon dioxid, 10 to 13 gm. of oxygen, and 20 to 30 calories of heat per hour. Of these factors of metabolism, it is highly probable that the truest factor is presented by the total energy exchange as directly measured, and hence taking into consideration all the data furnished by these two experiments, we can tentatively say that the writing of 1,600 words per hour on the typewriter results in a heat transformation over and above the resting metabolism of not far from 25 calories. At present too little is known regarding the energy transformation of various everyday activities to make any striking comparison, but [by other investigation] . . . it has been computed that there is an hourly energy expenditure of about 160 calories over and above the resting maintenance requirement by a man of 70 kg. walking along a level road at a rate of 2.7 miles per hour. It is seen, therefore, that the work of typewriting calls for very much less transformation of energy than does that of ordinary walking."

ANIMAL PRODUCTION.

The significance of animal industry in farm management, H. WERNER (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 79–99*).—A statistical study of the importance of animal production in Germany. There are some comments on modern methods of feeding, and the significance of different methods of farm management is discussed.

The principles and practice of feeding, including our available stock foods, W. H. DALRYMPLE (*Louisiana Stas. Bul. 115, pp. 3–63, figs. 12*).—This is a bulletin of general information on the principles of stock feeding. Many examples of rations for different kinds of stock are given, with special reference to the utilization of molasses, rice by-products, cotton-seed meal, Lespedeza hay, and other feeding stuffs which can be economically raised in Louisiana. The data with reference to the feeding of blackstrap molasses are based in part on replies received from a number of the large planters to a circular of inquiry as to their experience.

Analyses of registered feeding stuffs, J. T. WILLARD ET AL. (*Kansas Sta. Bul. 158, pp. 91–142. fig. 1*).—This bulletin gives a summary of the history of the feeding stuffs law and its administration, together with the amended law in full, and an exposition and explanation of the requirements of the law and the rulings made under it. Analyses of a great variety of feeds as made under the amended law are also reported.

The inspection shows that in general the feeds were fairly up to the guaranties. Most of the deficiencies were with corn chop, for which a guaranty is no longer required. The samples varied according to the region in which the feed was produced, and from a study of the different regions it appears that the protein content tends to become higher the farther West the feed originates.

Analyses of commercial feeding stuffs sold in Maryland, H. B. MCDONNELL ET AL. (*Md. Agr. Col. Quart., 1909, No. 44, pp. 7*).—Analyses are reported of cotton-seed, linseed, germ oil, corn, meat, and bone meals, gluten feeds, malt sprouts, dried brewers' grains, wheat bran and middlings, ground oats, oat straw, oat hulls, and corn hulls.

Alfalfa feeds, G. M. MACNIDER (*N. C. Dept. Agr., Div. Chem. Circ. 1, pp. 4*).—Analyses of alfalfa meal and mixed alfalfa feeds are reported.

Denaturing feeding barley (*Illus. Landw. Ztg., 29 (1909), No. 46, pp. 446, 447, figs. 6*).—This article describes a cheap and efficient method for denaturing with eosin barley which is imported for feeding purposes.

The American industry of corn products, T. B. WAGNER (*Jour. Soc. Chem. Indus., 28 (1909), No. 7, pp. 343–348, fig. 1*).—After a brief account of the history of the corn industry in America, the author describes the process of manufacturing corn oil, gluten meal, gluten feeds, starch, corn sirup, glucose, and other products of the corn kernel.

The use of waste products of vineyards as feeds for live stock, U. ROSSI (*Agr. Mod., 15 (1909), Nos. 21, pp. 282–284; 22, pp. 296–298; 23, pp. 311–313, fig. 1*).—Analyses of vinasse and grape marc are given and their use as stock feeds is discussed.

Tapioca flour for raising calves, A. GOUIN and P. ANDOUARD (*Bul. Soc. Nat. Agr. France, 68 (1908), No. 10, pp. 776–779; Bul. Sta. Agron. Loire-Inf., 1907–8, pp. 81–84*).—The authors found the nutritive value of tapioca flour about equal to that of potato starch when used as a supplementary feed with skim milk.

Lamb feeding for 1908–9, A. D. FAVILLE (*Wyoming Sta. Bul. 81, pp. 3–8, figs. 2*).—An experiment is reported which was made for the purpose of testing the value of Wyoming-grown grains for fattening purposes. Three lots of 35 sheep each were fed for 91 days on alfalfa of rather poor quality and equal amounts of grain. With the different grains the average daily gains per head were as follows: Corn 0.3 lb., emmer 0.23 lb., Scotch barley 0.33 lb. In each lot 17 of the sheep were of the Rambouillet type. The rest were crosses of Down sires with grade Merino dams. In each case the mutton grades made more rapid gains than the Rambouillet.

Comparative swine feeding experiments with sweet and sour skim milk at the Dairy Institute of Proskau in 1908, KLEIN (*Milchw. Zentbl., 5 (1909),*

No. 7, pp. 281–288).—Nine pigs 5 months of age were divided into three groups and fed for 15 weeks a basal ration of ground barley, potato flakes, and fish meal. Group 1 received on an average 4.8 kg. per head per day of sour skim milk as a supplementary ration, made an average daily gain per head of 0.574 kg., and dressed 81.3 per cent of the live weight. Group 2 received 4.8 kg. per day of sweet skim milk, made a corresponding gain of 0.584 kg., and dressed 84 per cent. Group 3 received 3 kg. of sweet skim milk per head per day, made a corresponding gain of 0.573 kg., and dressed 82 per cent.

Samples of fat taken from carcasses of the three groups gave the following averages: Group 1, water content 6.68 per cent, melting temperature at 0° C., 46.7, refractometer reading at 40°, 49, and iodin number, 52.9; group 2, water content 6.58 per cent melting temperature 46, refractometer reading 49, and iodin number 53.3; and group 3, water content 7.46 per cent, melting temperature 45.2, refractometer reading 49.2, and iodin number 55.

Fattening trials with hogs, J. H. Shepperd and W. B. Richards (*North Dakota Sta. Bul. 84, pp. 5–24, figs. 13*).—Experiments are reported in which barley and low-grade wheat are contrasted with corn as feeds for fattening hogs. The results are shown in the following table:

Comparison of barley, ground rejected wheat, and ground corn in fattening hogs.

Feed.	Number of pigs.	Number of days.	Daily gain per head.	Daily consumption per head.	Cost of gain per pound.	Grain consumed per pound gain.	Dressed weight.
			Lbs.	*Lbs.*	*Cents.*	*Lbs.*	*Per cent.*
Barley and shorts 4:1	6	83	1.23	7.08	5.20	5.74	76.2
Corn and shorts 4:1	6	83	1.50	7.01	4.31	4.66	77.9
Wheat and shorts 3:1	5	49	1.44	.....	.....	5.50	84.5
Corn meal and shorts 3:1	5	49	1.75	.....	.....	5.05	82.9

On comparing the carcasses the barley-fed lot was found to have less fat but a larger proportion of muscular tissue than the corn-fed lot; they were larger bodied and more of the bacon type. The Yorkshire-Berkshire cross had a better distribution of lean and fat than the Yorkshire-Poland China cross. There was a greater depth of fat on the backs and ribs of the pure-bred Chester White than on the various crosses with the Yorkshires.

Pastures for hogs, F. G. King (*Missouri Bd. Agr. Mo. Bul., 7 (1909), No. 5, pp. 39, figs. 6*).—This bulletin gives general information on pasture crops for hog raising in Missouri. The crops recommended are bluegrass, clover, alfalfa, cowpeas, rape, oats, sorghum, pumpkins, soy beans, artichokes, rye, and wheat.

On the significance of amid substances in animal nutrition, W. Völtz (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 433–448*).—This is a review and discussion of recent work on this subject.

Preliminary note on the action of yohimbine on the generative system, W. Cramer and F. H. A. Marshall (*Jour. Econ. Biol., 3 (1908), No. 4, pp. 127, 128*).—When 0.005 gm. of yohimbine in the form of tablets was administered twice daily for 2 weeks to dogs results were obtained similar to those secured by other investigators. The same results were obtained with rabbits. Apparently the drug by furnishing a rich supply of blood to the ovaries may arrest the normal process of follicular degeneration, thereby increasing fertility, but there is no evidence that it will induce ovulation in the rabbit. Yohimbine also promoted the development of the mammary glands and the secretion of milk.

The influence of yohimbine on the milk glands and milk secretion, HOLTERBACH (*Tierärztl. Rundschau, 15 (1909), No. 2, pp. 9, 10*).—Several cases are reported wherein yohimbine caused an increased flow of milk in cows and bitches, which agrees with the results obtained by Cramer and Marshall, noted above.

Contribution to the anatomy and physiology of the ovaries of wild and domesticated ruminants and swine, J. KÄPPELI (*Landw. Jahrb. Schweiz, 22 (1908), No. 3, pp. 53–129, pls. 6*).—Cattle, buffalo, deer, goats, sheep, and swine are considered in this account.

Critique on the estimation of the size of the thoracic cavity and comparative investigations on the position of the sternum in fast and slow horses, M. MÜLLER (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 137–154, pls. 2, fig. 1*).—Although the work of several investigators on this subject is briefly reviewed, this article is chiefly a criticism of von Lützow's method of measuring the sternum, previously reported (E. S. R., 21, p. 268). It is also stated that von Lützow's data do not show that heart and lung weights are proportionally larger in fast than in slow horses.

A new experience in measuring domesticated animals, C. LEHMANN (*Landw. Jahrb., 38 (1909), Ergänzungsb. 5, pp. 607–637, pls. 3, figs. 3, dgm. 1*).—This is a description of a new instrument called the stereometer, invented by Dr. C. Pulfrich, which consists of a modification of the stereocamera and contains two objectives with micrometer attachments.

The author made actual measurements of horses and compared them with results obtained with the stereometer. In many cases there was a close agreement, and it is thought that when discrepancies occurred they were due in part to inexperience in the use of the stereometer, or to the difficulty in getting accurate measurements with instruments. It is stated that the stereometer will probably not replace the measuring stick and calipers, but may prove a useful auxiliary.

The cattle skulls found in Pasquart and their relation to other subfossils and to modern breeds of cattle, H. SIEGFRIED (*Die Rinderschädelfunde von Pasquart und deren Stellung zu den Subfossilen und Rezenten Rinderrassen. Inaug. Diss., Univ. Bern, 1907; Abhandl. Schweiz. Palaeontol. Gesell., 34 (1907), Art. 5, pp. 56, pls. 4; abs. in Ztschr. Induktive Abstam. u. Vererbungslehre, 2 (1909), No. 2, pp. 143, 144*).—Two fine specimens of skulls and three occipital fragments were found at a depth of 2.6 meters near Biel in Pasquart. They appeared to be of the pure brachyceros type which, according to the author, had its origin in Asia, as subfossils of this type have been found at various points from northern India to the Swiss lake region.

Concerning blood lines and line breeding (Verwandtschaftszuchten), J. PETERS (*Arb. Deut. Gesell. Züchtungsk., 1909, No. 3, pp. 13, pls. 31*).—Photographs of typical animals and pedigree tables taken from the East Prussian Holland Herd Book Society are used to illustrate how inbreeding may be practiced to advantage in cattle breeding with animals of considerable constitutional vigor. There is a brief discussion of what constitutes inbreeding, and the author follows Lehndorff in measuring the degree of inbreeding and line breeding by the sum of the "free" generations of both parents; that is, the number of generations between the parents and the common ancestors.

Sex and its relation to the barring factor in poultry, H. D. GOODALE (*Science, n. ser., 29 (1909), No. 756, pp. 1004, 1005*).—The experiments with poultry reported are along lines previously noted (E. S. R., 20, p. 1170). The

results indicate that the female is always heterozygous in respect to sex and to barring when it is present.

Experimental investigations on the inheritance of hyperdactylism of fowls. II, The influence of the father, D. Barfurth (*Arch. Entwickl. Mech. Organ., 27 (1909), No. 4, pp. 653-661, pl. 1*).—A 5-toed Orpington cock was mated with 7 hens of the same breed. Of the 120 offspring 53, or 42.17 per cent, inherited the extra digit, as contrasted with 52.6 per cent inherited from a hyperdactyl mother (E. S. R., 20, p. 1170).

Sheep breeding experiments 1904–1907, D. A. Gilchrist (*County Northumb., Ed. Com., Bul. 13, pp. 8–11*).—When Oxford Down and Border Leicester rams were mated to half-breed ewes each cross gave about the same number of lambs, but the Oxford Down ram gave slightly better results as far as fat lambs were concerned. On an average of 4 seasons the Border Leicester cross produced much stronger lambs than the Oxford Down cross, as 1.6 per cent of the Border Leicester cross lambs died from weakness as compared with 8.6 per cent of the Oxford Down. On the average of 3 seasons the Border Leicester ram produced sheep which were ready for the butcher about 2 months earlier and realized 2s. 4d. per head more than the Oxford Down cross.

Crosses with a Lincoln ram were ready for the butcher at about the same age as the Oxford Down cross, but realized 8s. 10d. a head more. The Border Leicester cross shearlings were fat about 4 months earlier but realized 3s. 5d. a head less than the Lincoln cross shearlings.

A new breed of ducks (*Country Gent., 74 (1909), No. 2953, p. 845, fig. 1*).—A new breed of ducks, formerly known as the Campbell duck, but recently named the Khaki, is figured and described. It originated as a cross between the Rouen and Indian Runner ducks. The color is buff, with some of the markings of the Rouen. The females have indistinct pencilling in their plumage. Some of the drakes have a bronze neck and tail. It is claimed that these ducks are good layers as well as first-class table ducks.

The evolution of the live-stock industry [in Argentina], H. Gibson (*In Censo Agropecuario Nacional la Ganadería y la Agricultura en 1908. Buenos Aires: Govt., 1909, vol. 3, pp. 57–102*).—This is a history of the live-stock industry in Argentina from the introduction of horses by Mendoza in 1535 to the present time.

Statistics of live stock in Argentina in 1908, A. B. Martinez et al. (*Censo Agropecuario Nacional la Ganadería y la Agricultura en 1908. Buenos Aires: Govt., 1909, vol. 1, pp. XX+434, maps 17*).—Complete statistics are given in tabular form of the live stock in the different provinces of Argentina.

The meat trade of Argentina, J. A. Pillado (*In Censo Agropecuario Nacional la Ganadería y la Agricultura en 1908. Buenos Aires: Govt., 1909, vol. 3, pp. 317–343*).—This contains the history, present condition, and statistics of the meat industry in Argentina.

DAIRY FARMING—DAIRYING—AGROTECHNY.

A study of some Connecticut dairy herds, J. M. Truman (*Connecticut Storrs Sta. Bul. 57, pp. 287–310*).—This bulletin gives in detail the amount and cost of feed, yield of milk, and gross and net income of individual cows of 5 Connecticut dairy herds. The results are summarized in the following table, the averages given being for those cows which completed a full year's test in the case of herds 1–4, and for those which completed a nine months' test in the case of herd 5.

Average yield, cost of maintenance, and net profit per cow of 5 dairy herds.

Number of herd.	Number of cows.	Pounds of milk.	Average per cent fat.	Total income.	Cost of feed.	Total cost.	Net profit (+) or loss (−).
1	35	7,567	4.4	$152.78	$74.80	$119.80	+$32.98
2	12	6,381	5.4	130.67	70.43	115.43	+ 15.24
3	25	6,771	3.5	137.97	67.94	112.94	+ 24.99
4	46	7,164	3.6	145.28	82.56	127.56	+ 17.72
5	24	2,617	4.0	58.18	42.93	76.78	− 18.60

In estimating the total income the value of the calf was estimated at $2 and the manure at $10 per year. In computing the total cost a charge of $45 per year was made for the maintenance of each cow. It is stated that the first four herds are examples of the most advanced methods in dairy farming.

Dairying in China, J. H. Arnold (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3537, p. 6*).—The consul at Amoy, China, reports that the Amoy hinterland is a good cattle grazing country but that dairying is almost unknown. Cows have been bred for work rather than for milk. Most of the milk used in China is produced by the water buffalo and the black goat. There is a growing demand for condensed milk, which may eventually lead the people to appreciate the value of milk and take more interest in dairying.

The milch goat dairy, G. H. Wickersham (*Wichita, Kans., [1909], pp. 31, figs. 12*).—This is a small pamphlet on the goat as a dairy animal.

Better dairy methods, J. H. Frandson (*Idaho Sta. Bul. 67, pp. 3–48, figs. 18*).—Investigations by the station having shown that in many sections of Idaho cows are kept at a loss, this bulletin was prepared to supply the dairymen with such information as is needed to make dairying more profitable under conditions existing in the State. The principal topics treated are construction of the dairy barn and milk house, choosing dairy animals, feeding, keeping milk records, testing milk, and the care of milk and cream.

Report of Oestergötland Company Cow-testing Associations, 1907–8, K. A. Westman (*Östergötlands Lans Hushåll. Sällsk. Handl., 1909, No. 2, pp. 95*).—Thirty-nine different associations were in operation within the county during the year, and 8 new ones were formed; these 47 associations included 608 different herds and 19,968 cows, making 18.5 per cent of the total number of cows in the county. The cost of the associations ranged from 515 to 1,113 krone a year each, or from 1.24 to 5.98 krone per cow. The maximum yields per cow for any one association were 4,315.3 kg. milk and 164.24 kg. butter. Comparisons of the results obtained during successive years show that there has been a gradual increase in the yield and in the feed consumption of the herds, as well as in the returns obtained per 100 feed units consumed.

Report of the Alnarp Agricultural and Dairy Institute, 1908 (*Ber. Verks. Alnarps Landtbr. Inst. och Mejeri Inst., 1908, pp. 53+XXXVI*).

Proceedings of the American Association of Medical Milk Commissions (*Proc. Amer. Assoc. Med. Milk Com., 1 (1907), pp. 117*).—This is an account of the organization of an association in which 22 medical milk commissions were represented. Reports of the milk commissions of 12 cities were presented and the following papers were read: The Origin, General Plan, and Scope of the Medical Milk Commission, by H. L. Coit; Remarks on the Development of Dairy Hygiene in the United States, by R. G. Freeman; The Score Card for Use in Judging the Sanitary Condition of Dairies, and Requirements of Dairymen, by R. A. Pearson.

Proceedings of the American Association of Medical Milk Commissions (*Proc. Amer. Assoc. Med. Milk Com., 2 (1908), pp. 91*).—This contains reports of milk commissions in different parts of the country and the following papers: The Essentials in the Production of Clean Milk, by R. G. Freeman; Tuberculous Infection Through Milk, by E. C. Schroeder; The Transmission of Tuberculosis Through Milk, by M. P. Ravenel; Thermal Death Points of Milk Bacteria and Other Effects of Heat upon Milk, by M. J. Rosenau; Legislation as a Factor in the Production of Clean Milk, by H. E. Tuley; Development of Dairy Hygiene, by R. A. Pearson; and Federal Recognition of the Work of Medical Milk Commissions, by J. W. Kerr.

On the practical results of bacteriological investigations in dairying during late years, C. Barthel (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 2, pp. 100–110*).—A general résumé and discussion of the subject.

The origin of some milk enzyms, Grimmer (*Milchw. Zentbl., 5 (1909), No. 6, pp. 243–250*).—Extracts obtained from the milk glands of a ewe, she-goat, mare, sow, and three cows were made for the purpose of determining the origin of various enzyms.

The results indicated that peroxydase of milk is an endo-enzym and has its origin in the gland cells. Catalase was present in fresh milk of all the animals; although formed from glandular material the author considers it an ecto-enzym. Aldehydcatalase, reductase, and hydrogenase were not found in the milk glands, which indicates the probability that they are bacterial enzyms. Salolase was found in the glands of all the animals except the cows.

A new factor influencing the percentage of fat in milk, C. H. Eckles (*Hoard's Dairyman, 40 (1909), No. 23, p. 696*).—This is a preliminary note of an investigation in progress concerning the variation of the fat content in milk.

Apparently, when the ration of a cow is insufficient to support her milk production she draws on the fat stored in her body and the percentage of fat in the milk is increased. When she is gaining in weight, or storing fat in the body, there is a tendency for the percentage of fat in the milk to be lower.

"The possibility of increasing the percentage of fat in milk for a period after calving by the means mentioned has apparently been used by those who are the most successful in making these phenomenal 7-day tests. A cow that will average 3.2 per cent of fat for the year can with reasonable certainty be made to test 4 per cent or even higher for a week if properly handled. The way it is done is to fatten the cow as much as possible before calving. Then after calving, the animal is fed only moderately and the test is begun within 4 or 5 days. Under these conditions the animal has insufficient feed to support the enormous milk and fat production. Since her body is loaded with fat, this fat is taken from the tissues and a large amount of it secreted in the milk."

Contribution to the study of the germicidal power of milk, C. Bardelli (*Hyg. Viande et Lait, 3 (1909), No. 6, pp. 249–265*).—The work of other investigators on this topic is reviewed and additional experiments by the author are reported.

It is concluded that evidently there is a germicidal power in milk at temperatures below 60°. When a filtrate obtained by filtering milk through porcelain is added to milk the germicidal power is greater than that in normal milk. The author thinks the action is not due to a specially antimicrobic substance, but to the increased acidity in which certain species can not thrive. Temporarily there is, therefore, a decrease until the acid forms have had an opportunity to multiply.

A bibliography is appended.

Sterilization of milk by ultraviolet rays, V. Henri and G. Stodel (*Compt. Rend. Acad. Sci.* [*Paris*], *148* (*1909*), *No. 9, pp. 582, 583; abs. in Milch Ztg., 38* (*1909*), *No. 16, p. 183; Chem. Zentbl., 1909, I, No. 15, p. 1256*).—The authors found that milk could be sterilized by ultraviolet rays without sensibly raising the temperature. The method used is that of Courmont and Nogier (E. S. R., 20, p. 1113) for sterilizing potable water.

The sterilization of water [for washing butter] by means of ultraviolet rays, P. Dornic and P. Daire (*Indus. Lait.* [*Paris*], *34* (*1909*), *No. 24, pp. 481–484*).—The method used was essentially that described above. It can be recommended for treating wash water only when the butter has been made from pasteurized cream.

The temperature of pasteurization in relation to the conservation of the physiological properties of milk, P. Mazé, P. Guérault, and Dinescu (*Compt. Rend. Acad. Sci.* [*Paris*], *148* (*1909*), *No. 22, pp. 1469–1471*).—The experiments reported were undertaken to discover the cause of the decrease in the yield of cheese when the milk is heated.

On heating at a temperature between 65 and 80° C., less dry matter was found in the whey because the albumin coagulated and was retained by the curd. An addition of lactic acid before heating increased the amount of dry matter lost in the whey on heating to 65° and decreased it on heating to 75°. When the lactic acid was added after heating, the amount of dry matter lost in the whey was greatly decreased at temperatures between 65 and 80°. If, therefore, milk is pasteurized at a temperature of 65 or 68° the yield of cheese will be larger than when it is made from unpasteurized milk.

Homogenized milk, A. L. Tourchot (*Rpt. Min. Agr. Prov. Quebec, 1908, pp. 184–193*).—A method of homogenizing milk is described. After cleaning by the centrifuge and pasteurizing, the milk globules are reduced in size by driving them against a bowl of highly polished agate. The milk is then bottled and sterilized at 226° F. It is claimed that all bacteria are killed and that the milk will keep indefinitely without creaming.

Dried milk (*Amer. Food Jour., 4* (*1909*), *No. 7, pp. 26, 27*).—This is a general account of the methods used in the manufacture of dried milk.

A number of recent improvements in methods are noted. The tendency of casein to become denatured on drying has been overcome by employing a temperature not above 50° C. By homogenization the fat in milk can be prevented from floating on the surface. The flat vacuum pan is being displaced to some extent by special devices, such as allowing the milk to flow in a broad sheet over a drum or by throwing the milk in a fine spray over a revolving disk.

In some dried-milk plants a portion of the fat is removed, the milk is coagulated, and the albumin and sugar pass off in the whey. This method reduces the cost of drying, but the product is dried casein, not milk. Cotton-seed oil or animal fats are sometimes added to replace the milk fat.

Reference is made to the successful use of the genuine dried milks as food for infants.

The use of milk as food, R. D. Milner (*U. S. Dept. Agr., Farmers' Bul. 363, pp. 44, charts 4*).—This is a revised and extended edition of Farmers' Bulletin 74 (E. S. R., 10, p. 181), which it is designed to replace. Among the new topics treated are condensed milk, milk powder, milk for infants, modified milk, junket, cottage cheese, whey, fermented milks, and milk as a possible carrier of disease.

Whipped cream, C. W. Melick (*Maryland Sta. Bul. 136, pp. 285–300*). This bulletin reports experiments on the influence of different factors on the whipping quality of cream. The results obtained may be summarized as follows.

"There was no difference in the whipping qualities of gravity and separator cream. When any difference is experienced it is due to other factors and not to the method of getting the cream from milk.

"Cream for whipping purposes should contain at least 20 per cent butter fat. The best results were obtained with cream containing from 25 per cent to 40 per cent butter fat. . . . There was an almost definite ratio between the fat content and time required to whip.

"For best results cream should be held at as low a temperature as possible (35 to 45° F.) for at least 2 hours before whipping, and should be whipped in a cool room.

"For good results cream should be from 12 to 24 hours old. This gives an opportunity for the development of a small amount of acid in the cream. The acid effected a gelatinous consistency in the casein and albumin and thus facilitated the incorporation of air in whipping. When it is desired to whip fresh cream 0.3 per cent commercial lactic acid may be added to take the place of the acid which would develop by setting the cream from 12 to 24 hours. . . .

"Pasteurized cream may be whipped as easily as unpasteurized cream if it is thoroughly cooled and held at 35 to 45° for at least 2 hours before whipping. . . . The richer the cream the more time is required to cool, and an almost constant ratio exists between the density of the cream and the rate of cooling. . . .

"For good results cream should whip in from 30 to 60 seconds. When a longer time is required there is danger of some of the butter fat separating or churning.

"The addition of 0.1 to 0.3 per cent of commercial lactic acid to cream facilitated its whipping and made it possible to whip cream which was fresher, which contained less butter fat, and which was warmer than is advisable for the best results.

"The use of viscogen facilitated the whipping of cream to a greater extent than any other ingredient with the exception of lactic acid. It proved less effective than the latter and also less effective than a low temperature. The addition of viscogen caused cream to remain sweet from 12 to 24 hours longer than it otherwise would.

"The use of powdered sugar, powdered milk, salt, caramel, gelatin, junket, and cornstarch, each facilitated the whipping of cream to a small degree, and each to practically the same extent. None of them proved as effective as a low temperature and the development or addition of lactic acid. The addition of an excess of gelatin above 10 per cent or of cornstarch above 20 per cent caused a lumpy cream when whipped.

"The use of egg albumen with cream when whipped separately and mixed, produced a lighter foam, but had no effect upon the time required to whip. When mixed before the egg albumen was whipped, at temperatures above 40°, the whipping was retarded.

"The use of vanilla extract in ordinary quantities had no effect upon the whipping qualities of cream.

"The charging of cream with carbonic-acid gas without pressure had no effect on its whipping qualities but caused it to remain sweet from 12 to 24 hours longer.

"The use of cream from cows near the end of their lactation period whipped with slightly more difficulty than did cream from fresh cows.

"Whipped cream will not keep sweet as long as unwhipped cream.

"When any additions are made to cream to facilitate whipping it should be so labeled as to not deceive the purchaser."

Butter making in Maryland, C. W. MELICK (*Maryland Sta. Bul. 135, pp. 225–284, figs. 3*).—To determine the cause of lack of uniformity in Maryland butter, letters of inquiry concerning methods employed were sent to creameries throughout the State. Some of the creameries were visited and the herds of creamery patrons were also inspected. Investigations of the manufacture of sweet-cream butter are also reported in this bulletin.

Some of the causes of the poor quality of butter were found to be lack of proper sanitation on many farms and a deficiency in technical training of butter makers. As dairying is only a side issue among creamery patrons less attention is paid to essential details in handling the milk and cream than where dairying is made a specialty. Suggestions are given for making butter on the farm, for better methods of handling milk by creamery patrons, and for operating an average Maryland creamery.

Churnings were made of normal ripened cream, sweet cream with and without starters, and cream pasteurized at different temperatures. In all cases immediate cooling after pasteurizing cream reduced the germ content and lowered the percentage of acidity. Butter made from the best unpasteurized cream when a commercial starter was added scored on an average 92.8 per cent; that of the same kind of cream without a starter 90.1 per cent; while when a poorer grade of cream was used the difference was still greater. The keeping quality of butter was also much better when a starter was added. Natural starters, although carefully selected, were very seldom equal to starters made from commercial cultures, and butter made from cream ripened by them lacked the aroma and keeping qualities of the commercial-starter butter.

"Butter made from cream to which cream starter had been added scored 92 to 98 per cent and had a good but mild flavor. Skim and whole milk starters, however, usually contained more of the characteristic sharp acid taste. . . . Best results were obtained with starter which contained from 0.9 per cent to 1 per cent of acid and possessed the desired flavor in a pronounced state. . . .

"It was found that when starter was added to cream in the churn it failed to impart sufficient flavor and aroma to the butter. Adding the starter immediately after pasteurizing and allowing the cream to cool for at least 2 hours, during which time it was frequently stirred, permitted the lactic-acid bacteria to penetrate the fat globules and thus impart and continue to develop the desired flavor to the resulting butter. Much better results were obtained by the use of pasteurized than with unpasteurized cream by this method. . . .

"A few experiments were also made by adding starter to the butter in the churn and working it in. While practically as much improvement was produced in the flavor by this method as by the addition of lactic acid in a similar manner, the butter was always milky and usually mottled.

"The results . . . show a marked difference in favor of sweet cream churning over that of cream ripening. . . .

"Normal sweet cream may be successfully churned at temperatures below 52° F. when from 20 to 30 per cent of good starter has been added. When churned at higher temperatures or without starter the loss of fat was too great to warrant the adoption of this method.

"There was slightly less loss of fat in the buttermilk from cream ripened with good starter than from cream to which starter had been added only 2 hours previous to churning, but the score of the latter was enough higher to more than counterbalance this difference. . . .

"The use of commercial lactic acid as a substitute for starter proved advantageous only when used in very rancid cream or on butter from such cream after washing the butter thoroughly.

"A greater loss of fat in the buttermilk resulted from the use of low grades of cream than from high grades of cream by every process of ripening and manufacture employed.

"The addition of warm skim milk to cream which had been churned at temperatures below 48° proved very effective in causing the butter to gather quickly and in securing exhaustive churnings."

Is the continued increase in the fat content of buttermilk preventable? E. KONRADI (*Mælkeritid., 22 (1909), No. 17, pp. 395–399*).—Experiments made by the author lead him to conclude that an excessive fat content in the buttermilk can be prevented by careful churning, a low churning temperature, and possibly by an improved churn construction.

Manufacture and marketing of cottage cheese, skimmilk-buttermilk and ice cream, J. MICHELS (*North Carolina Sta. Bul. 202, pp. 5–11, figs. 3*).—This bulletin contains detailed directions as to the making and marketing of cottage cheese and skimmilk-buttermilk. The preparation of pure cultures of lactic-acid bacteria for use as starters in butter making is described. It is recommended that cream producers living near cities convert their cream into ice cream, and a few hints are given for building up a market for a high-grade product.

Goat's milk cheeses, A. ROLET (*Lait. et Indus. Ferme [Paris], 19 (1909), Nos. 11, pp. 81, 82; 12, pp. 89–91*).—Methods are described for the manufacture of Mont-d'Or, Saint-Marcellin, Chevrets, Persillés, Levroux, Rocamadour, and other goat cheeses.

Fermentation of Hawaiian molasses, S. S. PECK and N. DEERR (*Hawaiian Sugar Planters' Sta., Div. Agr. and Chem. Bul. 28, pp. 54, pls. 4, fig. 1*).—The investigations reported in this bulletin were undertaken with the object of learning to what extent and with what profit to the islands molasses could contribute to the alcohol supply of the United States. Fermentation studies were made of pure cultures of yeasts from various sources. The apparatus employed in making the pure culture tests is figured and described.

The average yield of alcohol obtained from the different worts varied from 80.6 to 84.9 per cent of the theoretical. The washes for these determinations were set up at specific gravities varying from 1.0575 to 1.0776, with sugar contents of from 7.94 to 10.51 gm. per 100 cc. With worts of higher densities there was a greater range in the percentages of alcohol obtained.

Analyses of molasses from different mills showed a wide variation. A comparison of factory and laboratory results showed that the yields obtained in these experiments are possible when working under factory conditions. Analyses of the lees were made to ascertain their fertilizer value. It is estimated that 1,000 gal. molasses with a specific gravity of 1.51 should yield 421 gal. of 95 per cent alcohol, 615 lbs. of potash, 46 lbs. of nitrogen, and 14 lbs. of phosphoric acid. The value of these products is estimated to be $151.63, and the cost of their production $59.85. The different species of yeasts used in the fermentation experiments are described.

Other results of the investigation are summarized by the authors as follows:

"The average content of sugars of 25 Hawaiian molasses for the crop of 1908 was 51.68 per cent.

"Of these sugars, 83 per cent can be converted by fermentation into alcohol.

"An unfermentable body, which has the same reducing power on copper solutions as glucose, is present to the extent of 6.13 per cent of the sugars, or 3.17 per cent of the molasses.

"The United States revenue regulations governing molasses distilleries is based on an estimated yield of from 80 to 95 per cent of proof spirit from the molasses. The yields of Hawaiian molasses vary from 62 to 93 per cent, the

average being 77 per cent. A modification of the regulations would be necessary before a molasses distilling enterprise could be profitably installed in these islands.

"Molasses contains a sufficiency of nutrients for the develdopment and action of yeast.

"Mineral stimulants give no apparent increase in the yield.

"The molasses contain no nonsugars which have a deleterious action on the fermentation.

"Aeration shortens the time of fermentation, without any increase in alcohol yield.

"Attenuation is not as great in molasses of Hawaii as in those of most countries where molasses is fermented, on account of the smaller quantities of sugars therein.

"Fermentation under pure culture increased the yield in alcohol 22 per cent over that when working under the usual factory conditions with adventitious fermentation. . . .

"Molasses as a source of alcohol and fertilizer has a value of about 8.3 cts. per gallon, exclusive of freight and interest.

"Of the yeasts from various countries where the molasses is fermented, most are budding yeasts of the type *Saccharomyces vordermanni;* that from Peru is, however, a fission yeast.

"Most of the yeasts worked well in sugar concentrations up to 14.6 gms. per 100 cc., the fermented wash containing up to 7.85 per cent alcohol by volume.

"A Monilia was isolated from the yeast from Natal, which gives an aroma resembling that of the best Jamaica rum."

How to can fruits and vegetables on the farm, MABEL E. MOORE (*Reprinted from Missouri Bd. Agr. Mo. Bul. 7 (1909), No. 3, pp. 50–62*).—The use of a canning device under farm conditions is discussed.

VETERINARY MEDICINE.

Theory and practice of veterinary medicine (*Chicago, 1909, 2. ed. rev., pp. 265*).—A second revised edition of this work, which consists of notes taken from lectures delivered by A. H. Baker.

Veterinary obstetrics, W. L. WILLIAMS (*Ithaca, N. Y., 1909, pp. X+1127, figs. 158*).—An extensive treatise upon veterinary obstetrics, and the diseases and accidents intimately associated therewith.

The pathology and differential diagnosis of infectious diseases of animals, V. A. MOORE (*Ithaca, N. Y., 1908, 3. ed., rev. and enl., pp. XVI+578, pls. 2, figs. 125*).—This is a third edition, revised and enlarged, the first of which has been previously noted (E. S. R., 14, p. 614).

Pathogenic micro-organisms, including bacteria and protozoa, W. H. PARK and ANNA W. WILLIAMS (*New York and Philadelphia, 1908, 3. ed., rev. and enl., pp. VIII+642, pls. 5, figs. 176, dgm. 1*).—This is a third revised and considerably enlarged edition. The portion devoted to protozoa has been thoroughly revised by the junior author. A glossary of some of the newer and more technical terms has been added.

An investigation of bacteria of the enteritidis group (Typus Gärtner and Typus Flügge), particularly the so-called meat poisoning and rat-destroying viruses, MÜHLENS, DAHM, and FÜRST (*Centbl. Bakt. [etc.], 1. Abt., Orig., 48 (1908), No. 1, pp. 1–29; abs. in Bul. Inst. Pasteur, 7 (1909), No. 1, p. 21*).—The first part of this account is devoted to bacteriological examinations of and feeding experiments with meats collected in the markets of Berlin. When these were

fed to white mice a mortality of more than 50 per cent resulted. At autopsies organisms of the Gärtner and Flügge types were isolated. None of either type, however, could be isolated from meats obtained from the markets.

In the second part of the work comparative studies of rat-destroying viruses are reported. The bacilli of Danysz, Dunbar, and Isatschenko, and of Ratin, morphologically, culturally, and biologically could not be separated from the Gärtner type of *B. enteritidis*. In the authors' opinions these agents should be used with great care.

The immunity of San Francisco rats to infection with Bacillus pestis, G. W. McCoy (*Jour. Infect. Diseases, 6 (1909), No. 3, pp. 289–295*).—The author finds that a considerable immunity to plague infection exists among the wild rats of San Francisco, the percentage of immunity being especially high among the old rats. The immunity encountered is considered natural in most cases and not acquired.

Some remarks on the natural history and diseases of the rats of Perth and Fremantle, Western Australia, J. B. Cleland (*Jour. Trop. Vet. Sci., 4 (1909), No. 2, pp. 264–268*).—Observations on the biology, diseases, and animal parasites of rats.

Insect flagellates, S. R. Christophers (*Jour. Trop. Vet. Sci., 4 (1909), No. 2, pp. 228–232*).—This is an account taken from the report of the King Institute of Preventive Medicine, Madras, for 1907.

Note on the occurrence of a large flagellate, associated with piroplasmata infection in a cow in British Columbia, T. Bowhill (*Vet. News, 1908, p. 474; Jour. Trop. Vet. Sci., 4 (1909), No. 1, pp. 104, 105, fig. 1*).—The piroplasma which has been found in cases of a disease of cattle, locally known as redwater, is said to occur mostly in pear-shaped and polygonal forms. The name *Piroplasma hudsonius bovis* is suggested for the parasite. Infected animals usually succumb after the third attack. Ticks have been collected from animals dead of the disease, but their rôle in its transmission has not been determined. During the investigation a flagellate was found. Endocorpuscular parasites were also found in the blood of a squirrel.

Remarks on piroplasmosis, E. Martini (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 2, pp. 121–123, pl. 1*).—The author states that at least one, and perhaps more, varieties of Piroplasma exist in eastern Asia, and that he has recently discovered a Piroplasma in calves in Manila.

Further notes on Piroplasma mutans, A. Theiler (*Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 115–133*).—Experiments are reported which show that *P. mutans* is a distinct species.

"The tests to prove the absence of immunity against the *P. bigeminum* infection succeeded in every instance. *P. mutans* does not protect against a subsequent inoculation of *P. bigeminum*, and this fact should give the final proof that *P. mutans* has to be considered as a distinct species. No mortality occurred amongst 25 animals injected with *P. mutans* pure. In some recent publications mention has been made of small piroplasms—usually found in connection with other diseases—which have been identified as *P. parvum*. This is decidedly incorrect, as these small piroplasms are described as inoculable, whereas, as has been frequently proved, *P. parvum* is not. It has, therefore, to be concluded that these piroplasms are probably *P. mutans*, or, in any case, belong to the same species."

The position of Spirochæta, R. Gonder (*Centbl. Bakt. [etc.], 1. Abt., Orig., 49 (1909), No. 2, pp. 190–196, pls. 2*).—The author concludes that the spirochetes should be regarded as a special order in the group of flagellata near the trypanosomes. Notes on *Spirochæta pinna* are contributed.

Have trypanosomes an ultra-microscopical stage in their life history? D. BRUCE and H. R. BATEMAN (*Proc. Roy. Soc.* [*London*], *Ser. B, 80 (1908), No. B 541, pp. 394–398; Jour. Trop. Vet. Sci., 4 (1909), No. 2, pp. 181–188; Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 173–177*).—From experiments in which Berkefeld ordinary filters were used it is concluded that "neither *Trypanosoma brucei* nor *T. evansi* develop in the body of the animal forms so small as to be capable of passing through the pores of the Berkefeld filter, and that in cultures of *T. lewisi* on blood-agar such small forms are also absent."

The cultivation of trypanosomes on artificial media (*Sleeping Sickness Bur.* [*London*] *Bul. 8, pp. 287–294*).—A review of the literature on this subject.

Preliminary note on the occurrence of a new variety of trypanosomiasis in the Island of Zanzibar, A. EDINGTON (*Proc. Roy. Soc.* [*London*], *Ser. B, 80 (1908), No. B 544, p. 545–549, charts 2*).—The author found in the blood of a horse in Zanzibar a trypanosome with which he successfully inoculated the horse, goat, ox, and rabbit. Asses, dogs, and monkeys appeared to resist the infection. The horse inoculated died in 27 days with fever and trypanosomes were always present. The goat suffered with fever, but no trypanosomes were ever discoverable in the blood. The ox did not appear in any way affected, but nevertheless its blood contained the trypanosomes. The rabbit, intraperitoneally injected, showed a few parasites. The trypanosome resembles *Trypanosoma dimorphon* and *T. congolense*, but has a more slender body. Neither Stomoxys nor tsetse flies have been found in Zanzibar.

The relationship of dosage of a drug to the size of the animal treated, especially in regard to the cause of the failures to cure trypanosomiasis and other protozoan diseases in man and in large animals, B. MOORE (*Bio-Chem. Jour., 4 (1909), No. 5–7, pp. 323–330*).—The author has summarized this account as follows:

"In the case of substances which act by stimulation or inflammation of surfaces, such as the intestinal tract, the maximum dose is proportional not to the body weight, but to the two-thirds power of the body weight. This leads to important differences in dosage in man and large animals. It also shows that the possibilities of treatment are diminished by natural means in man and large animals. These animals have naturally less intestinal and other surfaces per unit of weight; accordingly they can only take up proportionately less drug, and if any remedial substance is manufactured by the surface cells, they can only manufacture relatively less of this than the smaller animal. Also in general terms, uptake and output of poison or infection are relatively more rapid in the small animal. The small animal and child are hence at the same time more susceptible to onset of infection, and have more power of recuperation when infected."

Experiments regarding the natural transmission of surra carried out at Mohand in 1908, A. S. LEESE (*Jour. Trop. Vet. Sci., 4 (1909), No. 2, pp. 107–132, charts 2*).—The investigations here reported were conducted with the intention of determining whether blood-sucking flies are chiefly responsible for the spread of surra under natural conditions, the kinds of biting flies to be found in a surra zone, their biting habits, and the carrying out of transmission experiments.

The author's observations extended from 2 months before the rainy season to nearly its end. It was shown experimentally that of six ponies kept in contact with surra in the surra zone and in the surra season, the only two which did not become affected were those protected from blood-sucking flies. At Mohand, the blood-sucking flies found were Tabanus, Hæmatopota, Stomoxys,

Hippobosca, Hæmatobia, Chrysops, and Lyperosia, besides mosquitoes and sand flies. Curves given illustrating the prevalence of Tabanus, Hæmatopota, Stomoxys, mosquitoes, and sand flies in the dry weather and rains, respectively, show that the first four were scantily represented in hot weather, but increased enormously in the rains. The habits of each are here described.

An endeavor was made to obtain evidence of the cycle of development of the trypanosome in the mosquito without success, and a similar result attended an experiment with Stomoxys. By interrupted feeding a Trypanosome was transferred from a camel to a white rat by Tabanus, Hæmatopota, and Stomoxys. From the number of flies for each genus required, the author concludes that Tabanus has far more power of transmission than Stomoxys. With mosquitoes and sand flies the result was negative. Oxen were thought to be the chief reservoirs of infection. The author believes that Stomoxys becomes a transmitter when an epidemic has been started by Tabanus. It was noted that but few blood-sucking flies entered a dark stable.

Rocky Mountain spotted fever in the rabbit, L. Gomez (*Jour. Infect. Diseases, 6 (1909), No. 3, pp. 383–386*).—"The rabbit is susceptible to the virus of Rocky Mountain spotted fever as cultivated for a long time in the guinea pig. The disease is milder in its symptoms than that produced in the monkey and guinea pig. The blood of rabbits at the height of the disease is infective for guinea pigs. It has been possible to transmit the disease from one rabbit to another through six animals successively. The blood of rabbits which have recovered contains bodies which protect against the disease, such bodies being largely or entirely absent from the blood of normal rabbits."

On the transmission of animal tuberculosis to man, F. Basenau and Y. Van der Sluis (*Ztschr. Fleisch u. Milchhyg., 19 (1909), No. 7, pp. 237–240; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 166–168*).—Studies were made of tubercle bacilli obtained from veterinary surgeons who had become infected while making post-mortem examinations at the Amsterdam abattoir. The results of the investigations go to strengthen the belief that animal tuberculosis can be conveyed to man, and that after passage through the human body the original virus, as has already been shown by Klein, is still capable of producing tuberculosis in animals.

The tonsils of cattle and their relation to the origin of tuberculosis, M. Devrient (*Deut. Tierärztl. Wchnschr., 16 (1908), Nos. 51, pp. 729–734, pl. 1; 52, pp. 745–750, pl. 1; abs. in Bul. Inst. Pasteur, 7 (1909), No. 3, p. 112*).—This is a report of investigations conducted at the Berlin abattoir.

Ophthalmo- and cuti-reactions to tuberculin in cattle, Köhl (*Berlin. Tierärtztl. Wchnschr., 25 (1909), No. 5, pp. 92, 93; abs. in Bul. Inst. Pasteur, 7 (1909), No. 4, p. 155*).—In the author's experiments Koch's original tuberculin (undiluted) was used. One hundred bovines were tested by the ophthalmo-method, but in 13 cases the results did not agree with the post-mortem findings. In 9 of these cases the reaction was not manifest but the animals were tuberculous, while in the other 4 cases the reactions were positive but no lesions could be found at the post-mortem examinations. The results of the cuti-reaction were always negative.

On the intradermal reaction to tuberculin in animals, G. Moussu and C. Mantoux (*Bul. Soc. Cent. Méd. Vét., 85 (1908), No. 20, pp. 500–518, figs. 5*).—This is a more detailed account than that previously noted (E. S. R., 21, p. 178).

The intradermal reaction to tuberculin, Moussu (*Bul. Soc. Cent. Méd. Vét., 85 (1908), No. 24, pp. 649–655; abs. in Bul. Inst. Pasteur, 7 (1909), No. 4, pp. 154, 155*).—Investigations reported by the author confirm the earlier results obtained (see above). The new method appears to furnish a means of diagnosis equal to the subcutaneous injection.

Tuberculosis and the milk supply, J. MALCOLM (*Vet. Rec., 21 (1909), Nos. 1092, pp. 837–840; 1093, pp. 847–851*).—A paper read at the sessional meeting of the Royal Sanitary Institute held at Birmingham, England, May, 1909.

Vaccination of cattle for the prevention of tuberculosis, L. PEARSON (*Bul. Ohio Live Stock Assoc., 1909, No. 11, pp. 8*).—An address delivered at a joint session of the Ohio Live Stock Association and the Ohio Dairymen's Association at Columbus, in 1907.

Control of tuberculosis in domestic animals in Pennsylvania, L. A. KLEIN (*Amer. Vet. Rev., 34 (1909), No. 6, pp. 710–722*).—A paper read before the International Congress on Tuberculosis held at Washington, D. C., in 1908.

The mineral constituents of foods, H. INGLE (*Jour. Agr. Sci., 3 (1908), No. 1, pp. 22–31; Trop. Agr. and Mag. Ceylon Agr. Soc., 32 (1909), No. 5, pp. 448–451; Vet. Jour., 65 (1909), No. 409, pp. 359–364*).—The author is of the opinion that it is not the deficiency in lime and phosphoric acid of the South African-grown produce, as compared with the European-grown feeding stuffs of the same kind, which is to be blamed for the prevalence of osteoporosis among animals there, but rather the practice of feeding such animals exclusively upon a cereal diet. Analyses of Transvaal soils indicate that they are, as compared with English soils, very poor in phosphoric acid, nitrogen, and lime, but usually rich in potash. In framing rations for animals, due consideration should be given the amount and composition of the ash of foods. For previous work see an earlier note (E. S. R., 20, p. 683).

Catarrhal fever of sheep—bluetongue, R. W. DIXON (*Agr. Jour. Cape Good Hope, 34 (1909), No. 5, pp. 487–491; Vet. Jour., 65 (1909), No. 409, pp. 331–335*).—A general account of this disease, including the methods of preventive inoculation.

Two diseases of young camels, A. S. LEESE (*Jour. Trop. Vet. Sci., 4 (1909), No. 1, pp. 1–7, pl. 1*).—It is said that in nearly all the cattle breeding districts of the Punjab, camel pox is a benign disease through which almost all camel bachas must pass in the first or second year of life. A crude form of inoculation is practiced by the camel men of the district in the southeast of the Punjab and in Rajputana, with the object of getting young camels over the disease before the onset of the rains and thereby assuring a mild attack. This inoculation is not well known in the north of the Punjab and is only rarely practiced there.

Girki and giddah is a condition of the fetlock and knee joints found in camel bachas bred and reared on the Kala Chitta range in Attock district. It is distinct from rickets and is said to be caused by the hard surface of the range which is covered with loose stones.

Hog cholera, L. VAN ES (*Mo. Valley Vet. Bul., 4 (1909), No. 3, pp. 116–126*).—A somewhat detailed account of the disease.

The nature and action of suptol of Burow as a prophylactic agent in acute and chronic forms of swine plague, P. ANDREJEW (*Berlin. Tierärztl. Wchnschr., 1908, No. 46, pp. 818–820; abs. in Bul. Inst. Pasteur, 7 (1909), No. 1, p. 32*).—From the experiments here reported the author concludes that suptol does not possess any specific action in swine plague.

The structural alterations induced in the horse's foot by neurectomy, H. ACKERMANN (*Schweiz. Arch. Tierheilk., 51 (1909), Nos. 1, pp. 1–47; 2, pp. 81–102; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 177–183*).—A detailed account.

Epizootic abortion in the mare, DESOUBRY (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 4, pp. 62–68; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 154–156*).—The author here reports the results of studies made of the disease in several widely separated breeding centers in France. He is inclined

to accept the view that the virus of the disease may enter the system through the digestive tract, and considers it necessary to examine carefully the forage and grain used for feeding and to give particular attention to the quality of the drinking water.

Equine anemia, W. B. MACK (*Nevada Sta. Bul. 68, pp. 7–96, pl. 1, charts 13*).—This is a detailed report of preliminary investigations of a disease among horses which exists in eastern Nevada and is probably identical with infectious anemia of Europe. It is believed that it may also prove to be identical with the swamp fever of Manitoba and the Middle Western States.

"The disease is characterized clinically by profound cardiac and respiratory disturbances, an irregularly remittent fever, rapid emaciation, marked loss of nervous and muscular energy, progressive anemia, edema, and, in the last stages, by capillary hemorrhages.

"The primary lesion appears to consist of a progressive destruction of the red blood corpuscles, followed secondarily by parenchymatous degeneration of the kidneys and liver, and sometimes of the cardiac muscle; and by extensive changes in the vascular system. Toward the end of the course of the disease extensive capillary hemorrhages occur, especially in the heart, the gastro-intestinal tract, and the kidneys, and usually in the other visceral organs, beneath the serous coats, and into the subcutaneous and intermuscular connective tissues. The spleen is engorged and sometimes degenerated. The bone marrow undergoes profound alteration.

"The symptoms and lesions encountered appear sufficient to constitute a distinct clinical and pathological entity.

"Experiments apparently indicate the infectious character of the disease; that the virus exists in the blood; that the infectious agent is not revealed by the usual methods employed to demonstrate the presence of bacteria or protozoa; and that the disease is not contagious by the ordinary contact of animals.

"The natural mode of dissemination yet awaits demonstration.

"The mortality exceeds 90 per cent with recovery more apparent than real.

"Treatment has not been successful to any extent."

A bibliography is appended.

Glanders, W. B. MACK (*Nevada Sta. Circ. 1, pp. 8*).—A popular account of glanders, including information concerning its prevention and eradication, intended to furnish information to ranchmen and horse owners in certain localities in Nevada, where the disease has been discovered.

The antistreptococcic value of mallein, BUSY (*Rec. Méd. Vét., 85 (1908), No. 19, pp. 617–622*).—During the course of an epizootic of strangles in horses suspected of having glanders the author obtained good results from the use of mallein.

Contribution to the study of epizootic lymphangitis of horses in Senegal, A. THIROUX and L. TEPPAZ (*Ann. Inst. Pasteur, 23 (1909), No. 5, pp. 420–425, fig. 1*).—In addition to the information previously noted (E. S. R., 21, p. 488), the authors here consider the culture of the parasite, inoculation experiments, and method of treatment.

Experiments in which transmission of the disease was attempted by transferring pus to wounds resulted negatively. The disease appears to be localized in certain colonies on the Mediterranean coast where malaria occurs. It sometimes appears in France along canals and rivers in horses employed in towing boats. With this evidence in view the authors consider it very probable that the disease is transmitted by blood-sucking flies and possibly by mosquitoes.

Investigations on dourine, J. MAREK (*Deut. Tierärztl. Wchnschr., 17 (1909), No. 10, pp. 133–138; abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 169–173*).—The author succeeded in conveying dourine of Hungarian origin to horses through the act of coition and by inoculating fresh subjects with secretions from sexual organs, with blood, and with the serous contents of the "plaques" from diseased horses. Of 5 horses subcutaneously injected with blood from diseased horses 3 contracted the disease. Attempts to convey the disease to dogs, rabbits, guinea pigs, white rats, and white mice failed, although material containing trypanosomata which always produced the disease in horses was employed and was always injected in considerable quantities.

The experiments show that both European and extra-European dourine are caused by the same micro-organism and therefore represent etiologically a single disease, but the virulence of the organism shows great variations. The fact that *Trypanosoma equiperdum* is very seldom present in the circulating blood, especially in European dourine, explains why no blood-sucking insect plays any intermediate part in spreading the disease.

Bipolar-staining bacilli of the fowl cholera type as the cause of widespread, acute, and fatal pneumonia in horse and donkey young stock in India, E. C. WEBB (*Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 105–114, charts 3*).—The author here records an outbreak in India of a disease among young horses and donkeys caused by bipolar-staining cocco-bacilli.

Investigations on equine contagious pleuro-pneumonia, R. OSTERTAG (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 5 (1909), No. 3–4, pp. 179–223; abs. in Vet. Rec., 22 (1909), No. 1096, p. 23*).—Investigations of this disease have been conducted by the author in collaboration with Bougert, Wolffhügel, and Grabert.

They have led to the conclusion that a mixture of bacteria of different kinds, among which are the streptococci of suppuration, is always present in the nasal discharge of horses suffering from the disease, and that the same is true of the nasal mucus in healthy horses. The bacteria could not be found in the expired air, the bronchial mucus, the jugular blood, or the pulmonary blood of horses suffering from the disease but which recover, while in horses which show symptoms of the disease and succumb to pleurisy, streptococci agreeing in characteristics with those of suppuration could be found in the thoracic organs and in some cases also in blood. The authors did not succeed in transmitting the disease to healthy horses by means of the nasal discharge, expired air, pleural exudate, urine, or blood of affected animals, nor could it be transmitted to healthy horses by inoculation with the streptococci of Schutz or the "coccobacteria" of Lignières.

The employment of iodin in pneumonia, A. C. NEWSOM (*Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 143–145*).—Of 40 horses treated with iodin between April 30, 1907, and December 15, 1908, but 4 died. The iodin was administered in doses of 1 dram in bolus twice daily from the time diagnosis was made until convalescence was established, or until symptoms of iodism appeared. Where the condition suggested a necessity of stimulants, ether in dram doses was given hypodermically.

The author concludes from these cases that iodin is well tolerated and can be given in dram doses without fear of harm. He believes these results to have been better than those obtained from any other method of treatment with which he is acquainted.

Treatment of trypanosomiases of horses by orpiment administered alone or with atoxyl, A. THIROUX and L. TEPPAZ (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 2, pp. 115, 116; Ann. Inst. Pasteur, 23 (1909), No. 5, pp. 426–*

429).—In continuation of work previously noted (E. S. R., 21, pp. 184, 488) the authors report experiments conducted with orpiment as a remedy for baleri. They consider the experiments to have demonstrated that the drug has a high curative power for the equine trypanosomiases so widespread in West Africa, which are transmitted by tsetse flies. The trypanosomiases transmitted by tabanids, of which surra or M'Bori is the type, appear to be more difficult to cure.

Enzootic of equine piroplasmosis in Chaouia, Lafargue, Lussault, and Savary (*Rev. Gén. Méd. Vét., 12 (1908), No. 141, pp. 489–502, charts 3*).—The authors here report the occurrence of piroplasmosis in horses of the French military service in Chaouia, Morocco. Horses of the French race which have seen hard service are particularly susceptible to the disease. In the spring and summer of 1908 some 90 horses were affected. The mortality, which was low at the last of the enzootic, is said to have been from one-eighth to one-sixth of the affected animals. Many ticks are reported to have been taken from the diseased horses.

Treatment of experimental dourine in horses, Rennes (*Bul. Soc. Cent. Méd. Vét., 86 (1909), No. 8, pp. 135–137; Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 160–162*).—In experiments conducted by the author treatment with atoxyl and mercury appeared active but too dangerous to recommend. One case thus treated appeared to recover from dourine but died soon after from mercurial poisoning. Treatment with atoxyl and tartar emetic was very well borne and gave good results. One horse was thus cured in 2 months, after having been severely infected experimentally with material which rapidly killed one control animal and rendered two others seriously ill throughout the period of observation.

Piroplasma canis, Eggebrecht (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 5 (1908), No. 1–2, pp. 129–132; abs. in Vet. Rec., 22 (1909), No. 1097, p. 48*).—The author reports the occurrence of piroplasmosis in a sheep dog of the German breed, 2½ years old, which had lived continuously at Tsingtau, China.

The present status of our knowledge of the etiology of dog distemper, B. Galli-Valerio (*Centbl. Bakt. [etc.], 1. Abt., Ref., 41 (1908), No. 17–18, pp. 563–570, fig. 1*).—The author here reviews the subject at some length and gives references to the literature.

He concludes that dog distemper is caused by the Bacterium which he first described as *B. caniculæ*, and which is very probably identical with that described 5 years later by Lignières. This Bacterium takes a very definite position between the colon-typhoid and hemorrhagic septicemia groups. The filterable virus of Carré is not the cause of the disease for with it it is impossible to produce the disease with all its symptoms as is readily done with *B. caniculæ*. The author suggests that the symptoms of the disease supposed by Carré to have been due to a filterable virus may have been produced by an aggressin.

Further studies on fatal septicemia in young chickens, or white diarrhea, L. F. Rettger (*Jour. Med. Research, 21 (1909), No. 1, pp. 115–123*).—A paper read before the Society of American Bacteriologists in December, 1908.

The author concludes that "fatal septicemia and ordinary white diarrhea are one and the same disease. The malady is caused by a specific organism whose important characteristics I have described, and to which I have given the name of *Bacterium pullorum*. This organism occurs in the internal organs and in the unabsorbed yolk. The easiest and most satisfactory method of identifying the bacillus is by the agar streak and subsequent plating method given in this paper."

So-called white diarrhea of chicks, G. B. MORSE (*Rcl. Poultry Jour., 16 (1909), No. 5, pp. 570, 571, 593–597, figs. 27*).—This is an extended discussion of intestinal coccidiosis of chicks based upon investigations, of which an account has been previously noted (E. S. R., 19, p. 988). A discussion of the life history of the Coccidium is accompanied by numerous figures which illustrate the stages in its development. The author states that in all of his examinations of chicks dead from this disease, i. e., those that revealed distended ceca filled with cheesy matter, he has never failed to find the Coccidium.

Parasites and parasitic diseases of domestic fowls, L. G. NEUMANN (*Parasites et Maladies Parasitaires des Oiseaux Domestiques. Paris, 1909, pp. VIII+230, figs. 89*).—Chapters are presented on the parasites of the skin, connective tissues and muscles, digestive organs, liver, respiratory system, circulatory system, eye and ear, and genito-urinary organs.

Transmission of Plasmodium præcox to canary birds by Stegomyia fasciata, and the development of the parasite in the stomach and the salivary glands of this mosquito, R. O. NEUMANN (*Arch. Protistenk., 13 (1908), No. 1, pp. 23–69, pls. 3; abs. in Bul. Inst. Pasteur, 7 (1909), No. 4, pp. 169, 170*).—The author has followed the development of this Plasmodium in the stomach and salivary glands of *S. fasciata* and transmitted the infection by the punctures of infected mosquitoes.

An epidemic among English sparrows due to Bacillus cloacæ, T. H. GLENN (*Jour. Infect. Diseases, 6 (1909), No. 3, pp. 339–345*).—"A bacillus isolated from the blood of sparrows during an epidemic among these birds was the probable cause of their death, since it was obtained in pure culture from all that died, and similar symptoms were produced in pigeons inoculated with it. By passing the bacillus through animals, its virulence was increased so that it became pathogenic for guinea pigs and rabbits. So far as can be determined from the description given by other observers this bacillus resembles very closely certain bacteria isolated by them in bird epidemics and called by them *B. coli* or coli-like organisms. The bacillus found in sparrows gives all the cultural characteristics of *B. cloacæ*, a member of the proteus group."

Notes on some parasites in Burma, G. H. EVANS and T. RENNIE (*Jour. Trop. Vet. Sci., 4 (1909), No. 2, pp. 134–143, pls. 4, figs. 3*).—In various parts of the province distomiasis in elephants has been found more or less prevalent. Mention is made of *Fasciola jacksonii* which causes "rot" in elephants.

Epidemic of an urticarioid dermatitis due to a small mite (Pendiculoides ventricosus) in the straw of mattresses, J. GOLDBERGER and J. F. SCHAMBERG (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 28, pp. 973–975*).—A skin affection due to this mite is said to have prevailed in epidemic form in Philadephia and vicinity since the early part of May, 1909.

Hookworm disease in its relation to the negro, C. W. STILES (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 31, pp. 1083–1089*).—An account of the biology, effect upon the human host, and methods of preventing the disease caused by *Necator americanus*.

RURAL ENGINEERING.

Irrigation in the State of Washington, O. L. WALLER (*U. S. Dept. Agr., Office Expt. Stas. Bul. 214, pp. 64, pl. 1*).—This is one of the series of reports giving the present status of irrigation in the several arid States and Territories, previously noted (E. S. R., 21, p. 289), and is prepared especially for the purpose of supplying to prospective settlers reliable information as to the character of the land, water supply, crops, cost of land and water, methods of preparing

land for irrigation, and applying water to crops. The report describes the different sections of the State, showing opportunities for settlers and the conditions which incoming settlers will meet.

Data are given showing the irrigation conditions in the Columbia Basin in detail, the method of distributing water, the cost of clearing land, the capital needed for a successful start in the irrigated districts of the State, what constitutes good irrigable land, the securing of water appropriations, and subjects needing investigation in their application to the local conditions.

"Taking into consideration the present price of land and the time required to obtain results from permanent crops, the average settler should not undertake to establish a home in an irrigated country with less than $2,000."

Irrigation in New Mexico, V. L. SULLIVAN (*U. S. Dept. Agr., Office Expt. Stas. Bul. 215, pp. 42, pl. 1, fig. 1*).—This bulletin, another of the series regarding irrigation conditions in the arid regions of this country, discusses the present status of irrigation in New Mexico and is intended to furnish general information regarding the opportunities for settlement, the cost of land and water and of establishing homes on these lands, and the crops grown.

An introduction describing the natural and industrial conditions prevailing in the Territory is followed by a detailed description of its water resources. It is stated that New Mexico is using but a small part of the water that may be made available for irrigation, a large amount flowing out of the Territory and many acre-feet being lost through evaporation and seepage. The broken stratification causes many streams to disappear in the underflow, and it is predicted that this large underflow will be eventually pumped to the surface. The storage of flood waters is considered to be the most important means of furnishing irrigation water, as all the streams are more or less torrential and equalizing reservoirs can be built in the numerous basins.

The principal products of the irrigated lands include alfalfa, oats, corn, and wheat, and around the cities, vegetables, melons, and fruit. Alfalfa growing has been the predominant enterprise, but fruit is considered to be by far the best paying crop, conditions being extremely favorable.

A large part of the irrigation is still done by Mexicans and Indians who pursue antiquated methods, but progress is now being made by American enterprise and a water code was passed in 1907. Regarding future development the author considers that it should be along the following lines: (1) Increased duty of water; (2) more intensive farming; (3) scientific study of seepage, evaporation, and soil qualities; (4) development of storage, power and pumping; (5) adjudication of water rights; and (6) official collection of data.

Irrigation by pumping, A. CHATTERTON (*Madras: Govt., 1908, pp. 30*).—This pamphlet contains data regarding the installation and operation of oil engines for pumping, together with data showing the crops irrigated (principally rice), the duty of water, and costs. The author considers that the introduction of the oil engine will result in a great development of the agricultural interests of the country. The cause for the slow progress made in pumping is thought to be the scarcity and high cost of coal.

Report of the proceedings of the Western Canada Irrigation Association (*Rpt. Proc. Ann. Conv. West. Canada Irrig. Assoc., 2 (1908), pp. 34*).—This contains a summarized report of the proceedings of the convention of the Western Canada Irrigation Association held at Vernon, B. C., August 10–11, 1908. The discussions reported dealt chiefly with the subject of water rights and their present status in Western Canada, and included an account of some of the difficulties encountered in administration with suggestions as to remedying these by equitable and adequate laws.

Revenue report of the irrigation department, Punjab, for the triennial period 1905–6 to 1907–8 (*Rev. Rpt. Irrig. Dept. Punjab, 1905–1908, pp. 5+19+LXXIX, dgms. 3, map 1*).—This contains data relating to the cost, operating expenses and revenues of irrigation works in the Punjab, together with figures of various irrigation works, the nature and extent of crops, the duty of water and items relative to administration and management.

Report of the drainage convention held at Tallulah, La., March 11, 1909 (*Vicksburg, Miss., 1909, pp. 58*).—This contains a report of the proceedings and the papers read at the above convention. Among the papers were the following: Drainage, the Requirement of which is a Thorough Topographical and Geological Survey, by T. G. Dabney; Necessity of Drainage for Building and Maintenance of Levees, by F. M. Kerr; A Drainage Policy and Principle for Louisiana, by C. G. Elliott; Agriculture and Drainage, by J. E. Wing; and The Benefits of Drainage from a Financial and Sanitary Standpoint, by Bolton Smith.

Road improvement in South Carolina, E. J. Watson (*Good Roads Mag., n. ser., 10 (1909), No. 8, pp. 251–253*).—This article describes the methods of construction and cost of sand clay roads, a type which has proved to be the most suitable and economical in South Carolina. The materials are easily obtained and with convict labor the total cost of a 30-ft. road is stated to be not over $400 per mile, with an average annual cost of $10 per mile for maintenance. Additional advantages claimed for these roads are that they are improved rather than injured by automobile traffic and that very little machinery is needed in the construction, a road scraper, wheelers, dump wagons, and a road plow being all that are used. The roads are built without drains except in swampy places, a shoulder being left at the side which permits the surface water to be carried away.

An American farmobile, F. C. Perkins (*Sci. Amer., 101 (1909), No. 4, p. 61, fig. 1*).—This article contains a description and an illustration of a gasoline plow tractor having a cable and drum which is thrown into gear by a clutch for hauling in connection with the driving wheels. The machine is of American manufacture and is similar to one previously described (E. S. R., 21, p. 291).

Steam plowing and machinery investigations (*Philippine Agr. Rev. [English Ed.], 2 (1909), No. 1, pp. 15–18*).—This article contains an account of experience in steam plowing by the Bureau of Agriculture in the Philippine Islands.

Data are given as to the operating cost of a 35-horsepower engine hauling a 12-disk plow and of an 18-horsepower engine with a 6-disk plow. The first of these plowed an average of 2.58 hectares (6.375 acres) per day, at a cost of ₱12.54 per hectare ($2.54 per acre), while the other plowed 1.72 hectares (4.25 acres) a day at a cost of ₱11.24 per hectare ($2.28 per acre). The conditions were unfavorable as the land was not previously prepared, resulting in delays and breakage, and considerable variation was noted in the results of the tests according to the conditions met with. The costs are also high because, when the machine was halted for repairs, the wages of the help had to be continued.

Contrasted with these figures is, for the 18-horsepower 6-disk plow, an average of 3.80 hectares (9.39 acres) a day at a cost of ₱3.25 per hectare (66 cts. per acre) on a straight run of five days using wood instead of coal as fuel as was the case in the other runs reported.

[Mechanical milking machine] (*Engineer [London], 108 (1909), No. 2792, p. 13, figs. 2*).—There is illustrated in this article a milking machine recently exhibited at the show of the Royal Agricultural Society (England). It was

invented by H. J. Loquist and is entirely mechanical, avoiding all pneumatic devices.

The essentials of the machine are a driving gear composed of a central spur wheel in which a number of pinions are adapted to mesh. These are connected to the machine proper, which comprises four pairs of rubber-covered pads, one of each pair remaining stationary, while the other is caused to reciprocate on slides by means of a cam mechanism. This sliding motion is such that the action of the thumb and finger of the milker is said to be closely copied.

Domestic water supply on the farm (*Kans. Farmer, 47 (1909), No. 30, pp. 4, 5, figs. 2*).—Various methods and plans suitable for use in isolated houses, with the outline and plan for a windmill supply, are discussed. The plan is illustrated to show the arrangement of pipes, boiler, tub and other fixtures.

A farm cold storage house, D. A. GAUMNITZ (*Breeder's Gaz., 55 (1909), No. 26, p. 1454, fig. 1*).—A small cold storage house suitable for a farm or for a cooperative association of farmers is described and plans for its construction given.

City conveniences in farm homes (*Homestead, 54 (1909), No. 30, pp. 1233, 1234, figs. 4*).—In a plea for conveniences in farm homes the experience is cited of a considerable number of farmers in a Missouri town, who have installed modern improvements such as bathrooms, acetylene gas, and furnaces. In the author's opinion these examples show that farm living conditions may be greatly improved in this respect by the "expenditure of a small sum of money. It need not exceed $500 in any average case."

RURAL ECONOMICS.

The rural outlook, L. H. BAILEY and C. W. STILES (*Proc. N. Y. Farmers, 1908–9, pp. 47–66*).—These are two addresses, followed by a discussion, delivered at a meeting of the New York Farmers, February 16, 1909.

The address by Professor Bailey summarizes the work and findings of the Country Life Commission (E. S. R., 20, pp. 601, 1089) as to the deficiencies of rural life and the remedies proposed for its rehabilitation.

The address by Doctor Stiles deals with the sanitary conditions of farm life in the South and their effects on the physical, economic, and social welfare of the white and colored rural tenant class, the spread of diseases among the population, the enormous increase in the death rate, and the child labor and agricultural labor problems in the South. "About 80 per cent of the negro farms of the South have absolutely no sanitary provisions of any kind whatsoever, and about 43 per cent of the white farms of the South have none. And, what is worse, the people do not know the meaning of sanitation, nor do they know the dangers of an unsanitary condition. When we stop this death rate, what do we accomplish? In the first place, the pure matter of humanity; we save the lives of women and children. In the second place, from an economic standpoint we can relieve the labor scarcity of the South, and we can give to the southern cotton mills enough children over 14 years of age so that they will not have to work children under 14 years. The cotton mill at present is the best friend that these poor whites of the South have. The conditions on the white tenant one-horse farms are so bad that child labor in the cotton mill is a blessing to these people."

The speaker advocated federal control of rural sanitation. By the expenditure of about $2,000,000 it is believed unsanitary farms could be made sanitary and the death rate on farms in the South be rendered more nearly normal.

Help needed on the farm (*Farmers' Tribune, 32 (1909), No. 31, p. 3*).—This article calls attention to the large number of men needed on farms in

Nebraska, Minnesota, North Dakota, and other western States, as well as in the Canadian northwest. Wages range from $1.75 to $3.50 per day including board, but even at these high rates it is impossible to secure the necessary help. A comparison is made between the number of idle men in the cities and the call for labor on the farm, and the economic advantages of farm labor over city labor at the present time are emphasized.

Cooperative credit, W. H. BUCHAN (*Dept. Agr. Bengal, Quart. Jour., 2 (1909), No. 4, pp. 238–247*).—An address before the fourth Indian industrial conference at Madras dealing with the subject of mutual cooperative credit societies among the agricultural classes in India.

On June 30, 1908, there were 1,201 rural banks as against 740 at the end of the preceding year, the membership having increased from 54,500 to 93,200. The difficulties in the present system of mutual agricultural credit are pointed out, and a scheme is presented for the establishment of a central organization which can provide a place of remunerative deposit for the temporary surplus of individual banks, and for the necessary inspection and control of affiliated societies.

In behalf of small agricultural cooperative societies, G. LOTRIONTE (*Coltivatore, 55 (1909), Nos. 29, pp. 79–82; 30, pp. 101–105; 31, 143–146*).—This is a discussion of some of the features of the bill introduced into the Italian parliament on May 10, 1909, relating to small cooperative societies and mutual credit and insurance associations. A plea is made that still more liberal features of a law be passed for the greater encouragement of cooperative organizations which promise so much for the progress of agriculture and its dependent industries throughout Italy.

The Seventh National Congress of Agricultural Associations at Nancy (*Bul. Soc. Agr. France, 1909, July 15, pp. 72–77*).—This article discusses the economic significance of agricultural associations in France and reports the resolutions passed by the congress with reference to mutual live stock, fire, and accident insurance, mutual credit societies, mutual benefit organizations, agricultural savings banks, and small holdings. A vigorous protest is made against all legislative efforts to draw distinctions between agricultural and cooperative associations.

Annual report of the Agricultural Organization Society for the year ended December 31, 1908, R. A. YERBURGH and J. N. HARRIS (*Ann. Rpt. Agr. Organ. Soc. [London], 1908, pp. 99, figs. 3, map 1*).—This report gives an account of the progress of agricultural cooperation in England and Wales during 1908. The affiliated societies numbered 281, a net increase for the year of 118; the membership about 15,000, and the total value of business £770,000. These figures show large gains over the preceding year (E. S. R., 20, p. 794).

Six new agricultural credit societies were organized in 1908, but none had started business up to the close of the year. An effort is made to account for the slow development of cooperative credit in England and Wales. "The explanation is no doubt to be found in the innate conservatism, the clinging to old methods and the suspicion of new, that is so marked a characteristic of the British farmer and laborer. Still there is the balancing advantage that the foundations of cooperative credit, if being laid slowly, are being laid surely. There is, moreover, every reason for confidence that as the number of small holders increases there will be a considerable development of cooperative credit."

International Agricultural Institute, T. H. ELLIOTT (*London: Govt., 1909, pp. 99; rev. in Jour. Bd. Agr. [London], 16 (1909), No. 4, pp. 274–278*).—This report contains copies of the papers and correspondence between the British and Italian governments relative to the establishment and work of the institute,

a report by the British delegate to the general assembly on the proceedings of the permanent committee and of the general assembly in 1908, and a series of 9 appendixes which treat, respectively, of the regulations framed by a royal commission appointed by the Italian Government; the report as to the proposals of the permanent committee with regard to the organization and work of the institute, by L. Dop, delegate for France; the report as to the proposals of the permanent committee with regard to the salaries and conditions of retirement of the members of the staff of the institute, and as to its budget, by T. Müller, delegate for Germany; the statutes of the International Agricultural Institute; the list of the delegates at the meetings of the permanent committee held at Rome from May 29 to June 6, 1908; the list of the delegates to the general assembly held at Rome from November 27 to December 1, 1908; memoranda handed in by David Lubin, delegate of the United States; a letter addressed by John McGuirk, of the Liverpool Corn Trade Association, Ltd., to Mr. Lubin; and some observations on gathering, summarizing, and disseminating information on the staples of agriculture, by J. H. Hubback.

International Institute of Agriculture, D. C. Lee (*Amer. Elevator and Grain Trade, 28 (1909), No. 2, p. 77, fig. 1*).—This article calls attention to the important economic and social functions of the institute. Among these are the correction of the abuses which arise from the speculation in staple crops by furnishing reliable data on the condition and yield of crops in the world to those engaged in the trade and manufacture of agricultural products.

AGRICULTURAL EDUCATION.

Agricultural education in Wisconsin, J. B. Borden (*Ann. Rpt. Wis. Bd. Agr., 1908, pp. 382–399*).—This paper points out very clearly the general tendency of school text-book makers to deal only with the materials of urban subject-matter. The author states that "practically all of the books used by country pupils have been prepared and written by men who have had in mind the needs of city children." Arithmetic, though commonly held in high estimation by country pupils and their parents, is one of the worst offenders in this regard; and the opportunities of connecting the study of geography and English with the interests of a rural environment have been greatly neglected.

The author groups the causes of the influx of young people from the country to the town under three heads, viz, the lack of social opportunities, the unprofitableness of farm industries, and the long hours of labor; but he believes the effects of these influences have all been exaggerated in the public mind and that "the time has come when the assertion that the farm holds no remuneration, nothing but work, and no social advantages, should be disputed." He asserts that a careful comparison will show the actual advantages to lie with the advanced rural community, and believes that the work of the schools should lay emphasis upon these facts. The paper closes with an account of the helpful work of the county agricultural schools of Wisconsin and a plea that similar work should be inaugurated in the country training schools, the high schools generally, and the state normal schools. The author holds that the influence of the state university should be exerted more strongly in the direction of giving agriculture a definite place in the curricula of all the public schools.

Educational values (III), B. O. Aylesworth (*Jour. Ed. [Boston], 70 (1909), No. 5, pp. 119, 120*).—The author suggests a fifth year of vocational study, to be added to the ordinary high-school course, especially for the benefit of students who must use the high school as a "finishing" school for their life work.

Leaving the freshman year as at present, the author would in the sophomore and junior years offer such studies as would be preparatory to vocational subjects and give the science and mathematics a more practical interpretation. The senior year should offer the elements of at least six of the great vocations to such students as may elect them, followed by a fifth year wholly vocational in character.

The argument for this additional year is summarized as follows: Its work can not logically come earlier in the course and give the student adequate preparation for its benefits; it would give at least a measure of the maturity of mind and body needed for entering upon a vocation; and it could be added to the ordinary course without much expense and without instituting a new order of schools or interfering with the regular four-year course of those destined for college.

Studies most suitable for elementary schools (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 495–525*).—This is a report of the committee of the British Association for the Advancement of Science on the course of experimental, observational, and practical studies most suitable for elementary schools. Included in this report is the report of a subcommittee on elementary experimental science dealing with the relation of nature study and observation lessons to experimental science, the training of teachers, the organization of practical work in the school, the preparation of lessons, and the conclusions of the committee with reference to subject-matter and methods of instruction. An appendix to the report contains a syllabus of work in elementary experimental science, in which the first year's work is the same for boys' schools and girls' schools, but the work of the subsequent 3 years is differentiated. There is also given a contracted scheme of work for small schools where the upper classes are grouped for instruction in experimental science.

Eighth annual general report of the Department of Agriculture and Technical Instruction for Ireland (*Dept. Agr. and Tech. Instr., Ireland, Ann. Gen. Rpt., 8 (1907–8), pp. VI+632*).—A report on the department's administration, funds, and work during 1907–8, including agricultural and technical instruction.

Under agricultural instruction an account is given of the instruction afforded at the Royal College of Science at Dublin, the Albert Agricultural College at Glasnevin, agricultural stations, the Munster Institute at Cork, the Ulster Dairy School at Cookstown, schools of rural domestic economy, and itinerant instruction and special classes. The report on technical instruction includes the organization of a system of instruction in experimental science, drawing, manual instruction, and domestic economy in day secondary schools, the organization of technical instruction under local authorities, the training of teachers in domestic economy, and the work of the Irish Training School of Domestic Economy and the Killarney School of Housewifery.

The appendixes include a table showing the 1908 apportionment of funds for educational and other purposes, schemes of instruction in agricultural subjects, prospectuses of agricultural colleges and stations and schools of rural economy, a program of experimental science, drawing, and domestic economy for day secondary schools, programs of the institutions under the direct control of the department, examples of schemes of technical instruction in nonagricultural subjects, including domestic science, a list of day secondary schools showing grants paid for instruction in the subjects of the department's program during 1906–7, a list of home industries classes in receipt of aid during 1907–8, and a list of science, art, and technical schools and classes working in connection with the department or under local schemes.

Agricultural education, J. R. CAMPBELL (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 804, 805*).—A brief statement dealing mainly with the development and aims of the Albert Agricultural College, Glasnevin, Ireland.

University of California School of Agriculture (*California Sta. Circ. 43, pp. 3–14, figs. 12*).—A description of the equipment and courses of study of the school of agriculture at Davis.

Pacific coast entomological conference and special short course in horticulture, April and May, 1909 (*California Sta. Circ. 42, pp. 3–16*).—This is the preliminary program of the conference held at the University of California April 20–23, 1909 (E. S. R., 21, p. 94), and of a special short course in horticulture held April 26 to May 21, 1909.

One method of helping the farm boy, F. H. CROWELL (*Ann. Rpt. Mo. Bd. Agr., 41 (1908), pp. 207–211*).—This institute talk describes a 3 days' encampment with military features, at which 268 country boys were registered. Lectures and demonstrations were given on soils, corn, farm life, live-stock judging, and horticulture. The encampment was financed by local bankers.

MISCELLANEOUS.

First annual report of the Dickinson Subexperiment Station for the year 1908, L. R. WALDRON (*North Dakota Sta., Rpt. Dickinson Substa. 1908, pp. 39*).—This contains the organization list of the North Dakota Station and an account of the work of the Dickinson Substaion for 1908. The experimental work recorded is abstracted elsewhere in this issue.

Report of progress at the Troupe Substation, W. S. HOTCHKISS (*Texas Sta. Bul. 121, pp. 3–9*).—This summarizes the results secured at this substation since its establishment. The experimental work recorded is abstracted on pages 536 and 544 of this issue.

Report of Lincoln County Experiment Farm, J. E. STUBBS ET AL. (*Rpt. Lincoln Co. [Nev.] Expt. Farm 1907–8, pp. 16, pls. 15*).—This is the report of the board of control of the Lincoln County Experiment Farm, at Logan, Nev., for the biennium ended December 31, 1908. It contains a discussion of the history, work, equipment, and needs of the farm, and a financial statement for the biennium.

Concerning work which the station can and can not undertake for residents of the State, J. L. HILLS (*Vermont Sta. Circ. 3, pp. 6*).—This circular explains the functions of the station and discusses the lines of work which can and can not be undertaken.

American agricultural periodicals, G. M. TUCKER (*Albany, N. Y., 1909, pp. 10*).—This is a historical sketch of the development of the agricultural press of this country. The subject is discussed under 4 sections: (1) The 5 pioneers, all of which are believed to have been established during the decade ending with 1828, (2) the journals founded before 1850 and outliving the nineteenth century, (3) the development of more recent years, and (4) the branching off of rural journalism into specialties.

An index to some of the literature on agricultural subjects which may be had free (revised), W. E. LARSON (*Co. Supt. Manitowoc Co., Wis.: [Manitowoc], 1909, pp. 15*).—The Wisconsin Station bulletins, the farmers' institute bulletins of the University of Wisconsin, and the Farmers' Bulletins and some of the other free publications of this Department are classified and arranged in groups for easy reference.

NOTES.

Arizona University.—W. L. Fowler, a 1909 graduate of the University of Missouri, has been appointed instructor in animal husbandry.

Arkansas Station.—C. V. Ruzek, a 1909 graduate of the University of Wisconsin, has been appointed assistant agronomist. His work will consist largely in research in soil chemistry and physics.

California University.—A series of short courses began at Davis, October 4, and will continue till November 24. The subjects include dairy manufactures, market milk and cream supplies, irrigation, fertilizers, field and forage crops, poultry husbandry, animal industry and veterinary science, and horticulture, viticulture and entomology.

Georgia College.—*Science* announces a state appropriation of $10,000 for farmers' institutes.

Illinois University and Station.—Recent changes in staff include in the university the resignation of G. G. Coale, assistant in animal husbandry, the promotion of Louis D. Hall from associate in animal husbandry to the assistant professorship, and the appointment of K. V. T. Eckblaw as assistant in agricultural mechanics. In the station, assistants have been appointed as follows: D. L. James and L. R. Lang, dairy husbandry; C. E. Durst, olericulture; H. W. Stewart, soil survey; E. W. Bailey, plant breeding; A. H. Nehrling, floriculture; and W. A. Ruth, horticultural chemistry.

Purdue University.—O. E. Reed, assistant in dairying in the University of Missouri, has been appointed instructor in milk production.

Louisiana Stations.—F. C. Quereau has been appointed assistant director of the rice substation at Crowley.

Missouri University.—E. A. Cockefair has resigned as assistant in botany to become head of the department of agriculture in the State Normal School at Cape Girardeau, Mo.

Nebraska University and Station.—Dr. A. T. Peters has accepted a position in charge of the new Illinois State Biological Laboratory, for which a 40-acre site has been recently acquired near Springfield, Ill. The appointment becomes effective January 1, 1910.

New Mexico College and Station.—The college courses in all subjects have been raised one full year, thereby bringing them up to the standard college requirements. Four-year industrial courses of high school grade in agriculture, mechanic arts, domestic science, and business methods have also been introduced, these articulating with the college course. Three new buildings were completed in the spring of 1909, of which one is occupied by the departments of agriculture, horticulture, and irrigation engineering.

W. A. Sutherland, of Las Cruces, has been appointed regent, vice J. M. Webster.

Cornell University and Station.—At the last session of the legislature the education law in relation to the board of trustees was changed to provide for the appointment of five members by the governor, with the confirmation of the senate. Under this act the following have been designated: Frederick C.

Stevens, of Attica, for five years; Henry W. Sackett, of New York City, for four years; Thomas B. Wilson, of Halls Corners, for three years; Almon R. Eastman, of Waterville, for two years; and John N. Carlisle, of Watertown, for one year.

Ground has been broken for the greenhouse laboratories authorized by the last legislature, and it is expected that these will be ready for occupancy during the winter. The plans as approved provide for a building with about 10,000 square feet of glass, in addition to laboratories and potting sheds with about 6,800 square feet of floor space.

Science notes that a temporary industrial fellowship in plant pathology has been established for two years by a firm of manufacturers of spraying apparatus, who are to contribute each year $1,000 for salary and $500 for other expenses. Errett Wallace, a 1909 recipient of the master's degree, has been appointed to this fellowship, the purpose of which is to investigate the value of commercial lime-sulphur mixtures as fungicides. The work will be conducted in field laboratories, that for the present season being on a fruit farm near Ithaca. The chief problem under study at present is the efficiency of these mixtures as summer sprays for the control of peach and apple diseases.

North Dakota College.—*The Pacific Northwest* announces that P. S. Rose, of the chair of engineering and physics, has resigned to accept a position on the editorial staff of *The American Thresherman* and the *Gas Review*.

Pennsylvania College and Station.—In the death, on October 2, of William C. Patterson, superintendent of farms, buildings, and grounds, the institution loses one of its most respected and efficient officers. Mr. Patterson had been connected with the institution since the spring of 1871, and had occupied a unique position, far exceeding in importance that ordinarily indicated by his title.

In the early years when the work upon the farm and the janitor service were all performed by students, it was his duty to assign the work and to see that it was properly performed. Under his efficient management the farms belonging to the college were brought into a good state of tilth and greatly improved in fertility. These farms were conducted in a thoroughly businesslike manner, and with their improvement became a source of revenue to the college. Upon the beginning of experimental work, Mr. Patterson assumed charge of the details of the care of the plats and of the experimental herd. For many years he kept the field records of the extensive field and rotation experiments, and had general direction of the details in the feeding experiments. Here his good management and his reliability, together with his attention to details, counted for much, and contributed in an important way to the proper conduct of the work.

Mr. Patterson's faithfulness, excellent judgment, friendly disposition, and sincerity of purpose made him to a remarkable degree the trusted and confidential adviser of students, members of the faculty, and of the board of trustees, through a long period of service. A memorial adopted by the faculty of the college records the high character of his service and the estimation in which he was held. This is summed up in the closing paragraph in the following words: "In the death of William Calvin Patterson the Pennsylvania State College has lost a faithful servant and a trusted adviser, and the members of its faculty a personal friend."

Mr. Patterson was likewise a leading citizen of the community. He was president of the national bank at State College, and a director of the First National Bank of Bellefonte, Pa. For many years he was an active member of the Grand Army of the Republic, having served over three years in the Army of the Potomac, during which time he was for several months confined in Libby prison, and being brevetted captain at the time of his discharge. He is survived

by his wife and four children, one of whom, H. J. Patterson, is director of the Maryland Station.

West Virginia University.—The board of regents has established a department of domestic science, with Miss Neva A. Scott in charge.

American Association of Farmers' Institute Workers.—The fourteenth annual meeting of this association was held in Portland, Oreg., August 16 and 17. There were 103 delegates and visitors registered, representing 23 States and Territories, 3 of the provinces of Canada, and the District of Columbia.

Statistical reports as to the condition of the farmers' institutes in the United States and Canada at the close of the past year were read from 33 States, 1 Territory, and 7 provinces. The total number of sessions held by the regular institutes was 18,797, and there were also 180 sessions of round-up institutes, 201 sessions of normal institutes, 1,280 sessions of independent institutes, 324 days of institute trains, and 405 picnics and harvest home meetings. The total attendance upon all of the institutes and meetings was 2,498,426 and the cost was $387,929.80. The reports indicated that the institutes throughout the United States and Canada have maintained interest unabated, and also that they are so rapidly increasing that the directors have found it impossible to satisfy fully the growing demands.

Reports were presented by the chairmen of the standing committees on institute organization and methods, institute lecturers, cooperation with other educational agencies, movable schools of agriculture, boys' and girls' institutes, and women's institutes.

The president of the association, J. L. Ellsworth of Massachusetts, in his address cautioned against too great centralization of the institute, and urged that local cooperation be encouraged to beget a sense of individual responsibility in the locality for the success of the work. Without this, he maintained, there will be lack of enthusiasm and consequent failure to secure the best results. The committee on organization and methods also called attention to the importance of local cooperation, and suggested that the interest of business and professional men in the several localities should be enlisted as well as that of farming people. The committee placed special emphasis on securing the cooperation of the boys and girls, and suggested that this might be accomplished by having them engage in experimental or demonstration work, with directions to report their results at the next institute meeting.

The committee on boys' and girls' institutes reported that whereas in 1907 only 6 States held institutes for boys and girls, at present 16 States have organizations conducting work of this character. Many of these institutes are the outcome of contests in corn growing, cattle judging, poultry rearing, etc. The competitive plan has been extensively utilized, and has been found to bring zest and continued interest.

The functions of the farmers' institute and the place that it will occupy in the future in the field of extension work were discussed quite fully by the committee on cooperation with other educational agencies. Now that more or less complete extension departments have been organized in twenty-five of the agricultural colleges, and others are ready to undertake this work, it is believed that the position of the farmers' institute in its relation to this movement needs to be defined. The committee were decided in the view that the farmers' institute will always have an important place in any system of extension work that may be organized. There will, nevertheless, be other organizations and other methods of giving instruction in agriculture to rural people that will supplement the institute, and accomplish that which it can not do so effectively. It was held by the committee that the most cordial and active cooperation

should be maintained between the institute and all other forms of agricultural extension work.

In the discussion of the report of the committee on women's institutes the fact was brought out that in the Province of Ontario, Canada, the women's institutes are developing more rapidly, both as to the number of meetings and persons in attendance, than the institutes for men. During the past year there were held there 4,050 sessions of women's institutes with a total attendance of 105,000, besides 4 normal institutes for women with an attendance of 2,050, and 20 special institutes and picnics with an estimated attendance of 3,500. The success of these organizations in Ontario was deemed conclusive as to the practicability of utilizing farmers' institutes in educating and interesting country women.

Papers specially prepared for presentation before the association were read by Director J. Withycombe, of the Oregon Station, and Charles H. Tuck, of Cornell University, upon field demonstration work; by W. T. Clarke, of the University of California, upon the employment of experts to visit individual farmers and give advice respecting the improvement of their practice; by G. A. Gigault, of Quebec, Canada, and O. M. Olson, of the Washington College, on the introduction of prize contests along agricultural lines among adult farmers; by Dean H. L. Russell, of the Wisconsin University and Station, and H. M. Cottrell, of the Colorado College, on field institutes; by W. J. Black, Quebec, Canada, on sales fairs; by D. W. Working, of the West Virginia University, on movable schools of agriculture; and by G. A. Putnam, Toronto, Ontario, and L. A. Merrill, of the Utah College and Station, on women's institutes.

The officers of the association chosen for the ensuing year are: President, G. A. Putnam, Toronto, Ontario; vice-president, A. M. Soule, of the Georgia College; secretary-treasurer, John Hamilton, of this Office; executive committee, W. T. Clarke, of the University of California, chairman; Val Keyser, of the University of Nebraska; and Franklin Dye, Trenton, N. J.

The resolutions adopted by the association indorse the work inaugurated by the Association of American Agricultural Colleges and Experiment Stations with reference to federal aid for extension work in agriculture. The executive committee of the association was instructed to urge upon Congress the appropriation of a sum sufficient to enable the adequate development of the work undertaken by the Farmers' Institute Specialist of this Office. Institutes for and by women in connection with the farmers' institutes were indorsed, as well as the work of the farmers' institutes in endeavoring to interest boys and girls in agriculture.

Agricultural Education in Michigan.—The legislature of Michigan at its recent session authorized the Michigan Agricultural College to grant 3-year state teachers' certificates to such of its graduates as have completed the regular 4-year course in agriculture together with a course in pedagogics covering at least one-half year of special instruction in that subject. The legislature also empowered the governor to appoint a commission of not less than five nor more than seven members to make a careful study of the conditions of elementary, industrial, and agricultural education in the State, and to present a report setting forth these conditions and making recommendations for a plan of elementary, industrial, and agricultural training in the public schools. This report is to be submitted or or before January 1, 1911.

Y. M. C. A. Lecture Course in Agriculture.—A recent number of *Farm and Ranch* reports an attempt made last year in the Riverside (Cal.) Y. M. C. A. to develop a course of lectures for citrus growers. The experiment was so successful that this year the illustrated lectures will include every phase of

the subject, from preparing the young trees for planting to harvesting the crop.

New Journals.—*Boletin del Ministerio de Fomento* has been established as the monthly organ of the minister of public works of Venezuela. Each number is to consist of three parts, of which the first is to be devoted to a discussion of scientific questions related to the work of the various bureaus of the department of public works; the second to official decrees, rulings, and similar information; and the third to official correspondence upon matters of general interest. An outline of the scope of the newly established Bureau of Agriculture, Zootechny, and Colonization is included in the initial number.

Boletín de la Asociación de Agricultores de España is the monthly organ of the Spanish Agricultural Association and the Spanish Chamber of Agriculture, and is under the editorship of the secretary-general of the association. The initial number describes in detail the work of the association.

Zeitschrift für Reich- und Geschmackstoffe is a semimonthly international review of the industries dealing with ethereal oils, ether, essences, spices and condiments, perfumes, cosmetics, soaps, oils, foods, and drugs. The contents include both original and reprinted articles, abstracts, notes, and book reviews.

Bollettino delle Rr. Cattedre Ambulanti d'Agricoltura della Sardegna is being published monthly as the organ of the traveling schools of agriculture in Sardinia. The July number includes articles on The Freeing of the Farmer from Usury, Results of Field Demonstrations in Sardinia, and The Need of Improving the Pastures, brief notes on tobacco growing, the oïdium of grapes, and other topics, answers to correspondents, a summary of the itinerary followed by the various traveling instructors of the traveling schools during the preceding months, and plans for future work.

The Grecian Agricultural Society has begun the publication at Athens of monthly reports of its work. These reports also contain original articles, that for July including articles on Grafting the Wild Olive Tree and the Importance of its Domestication, The Improvement of the Grecian Horse, The Despised Tree (*Ailanthus glandulosa*), The Cheese of Saronika, and An Inspection of the Bee Keepers' School, as well as general notes on agriculture and on the work of the society during the month.

Bulletin de l'Office International d'Hygiène Publique is being published at Paris as the organ of the International Office of Public Hygiene. The numbers contain the text of recent legislation, statistics as to epidemics and other health data, general articles dealing with health and sanitation, and abstracts of current work along these lines.

Necrology.—Dr. Leonard Pearson, state veterinarian of Pennsylvania and dean of the University of Pennsylvania Veterinary School, died at Bruceton, Newfoundland, September 20, following an illness of several months. Doctor Pearson was born at Evansville, Ind., August 17, 1868, and was graduated in 1888 from the College of Agriculture of Cornell University. After an interval spent in the employ of this Department in its campaign for the suppression of contagious pleuro-pneumonia, he took up veterinary studies and was graduated from the veterinary department of the University of Pennsylvania in 1890. He then went abroad, attending lectures in the veterinary schools of Berlin and Dresden, and studying bacteriology in Koch's laboratory and by special arrangement in the laboratory of the veterinary department of the German army. In September, 1891, he was appointed assistant professor of the theory and practice of veterinary medicine at the University of Pennsylvania, three years later was promoted to a full professorship, and in 1897 was made dean of the veterinary school.

Upon the establishment of the State Live Stock Board in 1895, Doctor Pearson, who had previously served as veterinary surgeon to the State Board of Agriculture, received the appointment as veterinarian. In this position he rendered large public service, especially with regard to the control of tuberculosis, and last spring was active in the suppression of the epidemic of foot-and-mouth disease. He was editor of the *Veterinary Magazine*, and contributed a large number of papers on veterinary science and zootechny to veterinary, medical, and agricultural journals. He had served as nonresident lecturer in veterinary science at the Pennsylvania State College, as president of the American Veterinary Association (1899–1900), and was closely identified with a large number of state and national organizations devoted to veterinary science, agriculture, and public health.

Emil C. Hansen, director of the Carlsberg Laboratory, Copenhagen, died August 27, after a brief illness. Professor Hansen was born in 1842, and began his notable researches on the morphology and physiology of the yeasts, molds, and related fungi in the Carlsberg Laboratory in 1877. Although his work was confined very largely to the Saccharomycetes, many of his achievements were of the highest significance in the fermentation industries, and led to important modifications of practice. He proved that wild yeasts were the cause of spoilage with beer, wine, and vinegar instead of bacteria as claimed by Pasteur, introduced pure cultures of yeasts, stimulated the use of pure cultures of yeast and bacteria in the brewing, dairy, and wine-making industries, and elaborated technique for the identification and characterization of yeasts. His papers, which were very numerous, are published chiefly in *Comptes Rendus des Travaux des Laboritoire de Carlsberg; Centralblatt für Bacteriologie, Parasitenkunde und Infectionskrankheiten; Annals of Botany;* and *The Journal of the Institute of Brewing.*

Miscellaneous.—An International Agricultural and Live Stock Exposition is to be held at Buenos Aires, June 3 to July 31, 1910, under the auspices of the Argentina Rural Society. Exhibits of live stock and agricultural products, agricultural machinery, and illustrative material relating to work in agricultural instruction and the encouragement of agriculture are to be shown.

An experimental farm under the general supervision of the Central Experimental Farm, Ottawa, is to be established on Prince Edward Island, a tract of 65 acres having been selected close to Charlottetown, on which experiments will be conducted with cereals, fruits, vegetables, trees, shrubs, etc. J. A. Clark, who received his agricultural education at Ontario Agricultural College and Cornell University, has been appointed superintendent.

The *School News and Practical Educator* (Chicago) has issued a set of inexpensive agricultural leaflets for school use in connection with the State course of study for rural schools. Series Nos. 1 to 5 consist of 12 leaflets on farm crops, 12 on farm animals, 11 on horticulture, 12 on general agriculture, and 12 on animal husbandry, respectively.

It is announced in the *Farmers' Gazette* that the National University of Ireland has empowered its faculty of science to grant the bachelor's and master's degrees in agricultural science. As yet no provision has been made for the establishment of courses in agriculture.

EXPERIMENT STATION RECORD.

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EXPERIMENT STATION RECORD.

VOL. XXI. DECEMBER, 1909. No. 7.

The personnel of the experiment stations has been a frequent and fruitful theme of discussion. It has become a matter of increasing importance as the stations have developed and more of their work has assumed the character of investigation. For several years it has been in large measure the keynote of advancement.

This discussion has brought about a fuller realization of the relation of the man to his work, and likewise of the broader relations of the station to its corps of workers. The man is the first and foremost factor in productive investigation. Without competent men the stations can make little progress in real investigation, although they may exert a considerable influence on practical farming operations by the simpler forms of experimentation and a dissemination of what others have brought to light. A large proportion of the work now calls for men of higher qualifications than formerly, and at the present stage the stations are less and less able to train men for their service; much less can they educate them and round out their preparation as specialists in agricultural science. They must look to the colleges and universities to provide men with a thorough foundation, which will require more than the regular college course; and these educational institutions should recognize the advancement in qualifications which the present conditions make necessary.

In spite of the recognized need of the stations for men of more advanced preparation, the progress in that direction is slow, due either to the failure of the institutions to provide the men or to the less exacting demands of the stations. That the latter is not the fundamental cause is clear from the large number of inquiries within the past two years for men of the kind of training which fits them to attack difficult scientific problems. The change in personnel continues with little abatement from year to year, and constitutes a disturbing element in the efficiency and continuity of investigation.

The returns for the organization lists of the stations, which are being revised at this time, furnish some interesting data as to the present tendencies in relation to permanency and to preparation. From them

it is possible to determine the number of changes in men of different grades from one institution to another, and, to considerable extent, the preparation of new men who are coming into the service.

These returns show that during the year covered no less than one hundred and fifty men of the scientific staff resigned or retired from their positions in the station work. Two of these were directors, and the resignation of one other has been called for to take effect January 1. The changes were largely in the assistant grade, twenty-seven being assistant chemists; but of the total number forty-three, or nearly a third, were heads of departments or in charge of special lines of work. In many cases the change was from one institution to another, but a considerable number dropped out of the station work entirely, at least for the time being.

To meet the resulting vacancies and provide for added growth, there were approximately two hundred and sixty-five new appointments during the year. While this includes persons who transferred from one station to another, over two hundred were new men who had not previously been connected with the station work. The large majority were of the assistant grade, but about fifty were heads of departments or in charge of independent lines of work. This indicates the activity there has been in recruiting the station forces during the past year, and accounts for the pressure for men of all grades and specialties.

The total number of employees on the scientific staff of the stations in the United States, as shown by the new organization lists, is 1,234. This number is exclusive of treasurers, accountants, registrars, stenographers, clerks, janitors, and laborers, and includes only the actual workers and their assistants. About one in seven of the station men changed during the year, and the appointments averaged more than four for each station.

Five years ago the total number of station workers was 765. The present list therefore shows a large increase, which has made heavy demands on the colleges. Considering the number who drop out from the station ranks, it is evident that on an average considerably more than a hundred new persons have been appointed each year for the past five years. In addition to this, the growth has been equally as large or larger in the teaching staff of the agricultural colleges, and new extension departments and other agencies calling for trained men have developed rapidly. This Department alone has taken large numbers of men of different grades in that period. It is probably no exaggeration to say that fully five hundred new men and women are now required annually to fill technical positions in institutions of this kind; and with the spread of agricultural teaching in secondary and normal schools, there is no likelihood of an immediate decrease. This is a demand worth catering to.

It is interesting to see in what measure the higher standards for preparation are being realized in the new appointments and the men substituted for former workers. The most practical method of judging of this is the prevalence of degrees granted to the new men for graduate study. While this does not tell the whole story and gives no indication of the experience which the men have had in station work, the possession of earned degrees is an evidence of advanced study, if conversely their absence does not always indicate a lack of such advantages.

Of the total number of persons at present on the scientific staff of the stations, four hundred and fifty-seven hold advanced degrees awarded for graduate study. Among this number nearly three hundred have the master's degree, forty-five have degrees in veterinary science and medicine, and one hundred and twenty have the doctor of philosophy.

Of the men who changed their positions during the year, fifty had degrees equivalent to the master's degree, and fifteen also held the Ph. D. Of the men appointed to new positions, sixty-eight had advanced degrees, eighteen of the number having the Ph. D. Among the new men who came into the work during the year only thirty-five, or one in six, appear to have taken advanced work leading to a degree, and about a dozen of these, or one in eighteen, have the Ph. D.

In some fifty cases it is possible to trace the direct substitution of new men in the place of former incumbents. Such comparisons do not show that there was much improvement in the apparent preparation of the new appointees, or indicate that great stress is being laid on the degree qualification. In over half the cases the new men had the same degrees as their predecessors. In a quarter of the cases men with lower degrees were appointed, and in the remaining cases (nine) the new appointees had more advanced degrees. About one-third of these substitutions were in heads of departments.

While the total list of station workers for 1909 shows a gain of thirty-five in those having advanced degrees and eighteen in the number having the Ph. D. degree, the relative proportion has changed but little, considering the increased number of persons. In the 1908 list, 1 in 2.65 had taken advanced degrees, and in that for 1909, 1 in 2.70; in the old list about 1 in 11 had the doctor's degree, and this year 1 in 10. During the year six men in the station work took master's degrees and nine the doctor's. This shows the influence of the stations in encouraging advanced study among their workers.

On the whole, the showing is disappointing, and it is not what might have been expected from the advocacy of better prepared men and the increased attendance in graduate courses at the colleges. It makes it clear that the colleges are not beginning to keep pace with the requirements, and that the stations are accepting many men who

have had little beyond the regular college course. In a considerable number of instances recourse has been had to colleges and universities where agriculture is not taught, in order to secure men of the training in science and investigation needed.

Advanced degrees when earned represent opportunity. They do not necessarily indicate productive ability, and the possession of them should be only one of the qualifications considered in candidates for station positions. They merely signify that the men bearing them have had the advantage of special advanced training of a kind which should teach them the meaning and spirit of science, and something of its methods. The institution where the degree was taken is to some extent a gage of the opportunity the man has enjoyed. But advanced study is of such importance and value as a preparation for station work that the mere possession of evidence of it is a decided point of advantage.

Little real preparation for a scientific career in any line can be obtained in the regular undergraduate courses at any institution. These courses merely give the man his groundwork and prepare him for what is to come. If he elects experiment station work as his career, graduate study is quite as essential as if he elected medicine or law or mathematics. This gives him his point of view, his broader and more critical outlook, his attitude, and his ideals. It is not merely informational, but its greatest influence is on the man himself, for it prepares him to weigh and profit by his own experience and that of others in further perfecting himself. Nothing can take the place of it but long experience and self-education, and even this is only partially effective with the average man. The handicap with which he starts out is likely to stay by him and to prevent his rising above a certain level.

Lack of a degree does not, of course, necessarily mean lack of opportunity. Many men pursue advanced courses who do not take degrees. They have the advantage of the association and the instruction, even though it is not so systematized. Others are capable of so profiting by their experience and associations as to grow in breadth and in knowledge, and in their conception of investigation. To but few, however, can this take the place of direct study, and it is not to be regarded as a short cut. Experience counts for more in the routine work and more elementary experiments than in investigation along new lines, where the preparation of the man is most apparent in his insight into the scientific aspects of problems and his ability to formulate a method of attack and procedure. It is evident in greater resourcefulness and ability in making safe generalizations.

Enforced changes in the staff due to resignations offer opportunity for working out higher standards in the personnel, provided men of

the desired grade can be found. In the case of heads of departments, or those in charge of independent lines of study, it is natural that the record of the appointee should be a prime consideration, for no recommendation can be stronger than demonstrated research ability.

In the case of assistants, however, this does not usually apply, although it may be argued that the work in the subordinate positions does not necessarily call for advanced training at the outset. But men are not satisfied to remain permanently in a subordinate position, and if they are good men should look forward to advancement. The ranks of the station staff are recruited largely from among the assistants who have demonstrated their ability, or whose period of service has made them useful in a special way. The rank and precedence of an assistant based largely on length of service, frequently stands in the way of advancing better trained and more worthy men. This results in embarrassment and injustice, and in a measure removes the incentive for more thorough preparation.

Every assistant, therefore, who enters the station work, except in a temporary way, should be urged and encouraged to pursue advanced study in a systematic way, for his independent collateral reading will not take the place of such study. His pursuit of such a course should, out of regard for his own interests as well as for the good of the work, be made as a rule a condition of advancement beyond a restricted grade of salary or position. Mere association with the work and collateral reading in a desultory way counts for comparatively little in the actual training of men for the experiment station work of the future. The character of that work is rapidly changing, as the extension features are being segregated and attention centered more largely on establishing new facts. The demands on the men who are to plan and conduct the progressive experiments and investigations of the stations call for more thorough and broader education and training than was formerly the case.

The young men entering the station employ should therefore have instilled into them from the first the need and the desire for thorough preparation, if they are to remain in it and make it a career. It is a mistake to recommend a man deficient in preparation to a more responsible position in another station, and it is likewise a mistake for a station to accept such a man on the assumption that he will answer.

The standards of requirements set by the stations will have a great influence in stimulating young men who enter this work. At the present time these standards are not always sufficiently high, and the institutions are not as exacting and discriminating as the best interests of the work suggest. The lack of men is largely responsible for this, but the waiving of requirements detracts from the encourage-

ment and incentive which there should be for men to spend their time and money in more thorough preparation.

The appointment of men on the station staff is not a matter for haste. The selection should be made after a careful canvass, and the aim should be set high. It is often better to delay appointment indefinitely than to accept a man who evidently does not meet the requirements and whose limitations will begin to be felt in a short time.

The apparent dearth of men can be relieved somewhat by drawing upon the universities and colleges giving postgraduate work in economic branches of science. Many of these institutions which have no agricultural departments are devoting more attention to the stations, as offering a field for their graduate students, and now that less extension work is required which calls for intimate knowledge of agricultural practice, positions in the stations are increasingly attractive to men from such institutions. The stations, if they will, can create a demand and set a standard which will be met by these higher institutions, and the latter will thus supplement the agricultural colleges in providing workers.

The point of view and general grasp which the agricultural graduate has is of material advantage, and if he will supplement his college course with advanced study will make him a strong man. But this point of view and familiarity with the subject are not everything, and unaided they can not take the place of the more advanced work or the special training which gives the prospective worker, not merely added information, but the proper attitude toward investigation, and teaches him the value and significance of a scientific fact.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

On some recent advances in our knowledge of the salts of proteins and of their rôle in biological phenomena, T. B. ROBERTSON (*Rpt. Austral. Assoc. Adv. Sci., 11 (1907), pp. 490–507*).—A digest of data on the subject.

Since, as the author points out, "proteins are ampholytes, and . . . combine with nonamphoteric acids, bases, and probably salts, and we have seen that an ampholyte system possesses the properties which have been ascribed to the ion-proteids," he considers that the following assumptions are justified:

"The compounds which have been termed 'ion-proteids' are in reality ampho-salts of the proteins (e. g., NaXOH, HXCl).

"The nondissociable compounds of protein with non-amphoteric ions which exist in tissues are in reality ampho-salts dissociating as acids and bases or else di-salts (e. g., $NaX^+ + OH^-$, $H^+ + XCl^-$ or NaXCl).

"The influence of electrolytes upon the properties and reactions of living tissues may probably be referred in the main to alterations in the ratio of the (basic ampholates) e. g., $HX^+ + OH^-$) to the acid ampholates (e. g., $H^+ + XOH^-$ and to the formation of ampho-salts and di-salts."

Hydrolysis of ox muscle, T. B. OSBORNE and D. B. JONES (*Amer. Jour. Physiol., 24 (1909), No. 5, pp. 437–446*).—The partition of nitrogen in beef muscle, as determined by the modified Hausmann method, was nitrogen as ammonia 0.89 per cent, as basic nitrogen 4.42 per cent, as nonbasic nitrogen 10.44 per cent, and as nitrogen in magnesium oxid precipitate 0.43 per cent, making a total of 16.18 per cent.

"The nitrogen contained in the histidin, arginin, and lysin was equal to 4.32 per cent of the dry muscle, which agrees very closely with that precipitated by phosphotungstic acid, thereby indicating the probable accuracy of the determination of these bases."

Electrolytes and colloids. The physical state of gluten, T. B. WOOD and W. B. HARDY (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 545, pp. 38–43, figs. 2; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 559, I, p. 341*).—The gliadin of wheat is insoluble in distilled water and in acid over certain critical concentrations. Dilute acid destroys this cohesion and forms hydrosols, but salt solutions containing acid reestablish the cohesiveness. Alkalis act in a similar manner as the acids.

The phenomenon is therefore in agreement with the hypothesis that gluten hydrosol is a pseudo-solution caused by the existence of an electrical double layer around the gluten particles. The hypothesis is supported by measurements of the potential differences between the 2 faces of the double layer by means of the electrical conductivity of acid solutions of gluten and the rate of transportation of the particles in a uniform electrical field.

Colloid chemistry; an important branch of investigation for the agriculturist, W. CZERMAK (*Fühling's Landw. Ztg., 58 (1909), No. 17, pp. 627–637*). A brief description of colloid chemistry and its probable relation to agriculture.

13042—09——2

The nature of the acid soluble phosphorus compounds of some important feeding materials, E. B. Hart and W. E. Tottingham (*Jour. Biol. Chem., 6 (1909), No. 5, pp. 431–444*).—The nature of the phosphorus compounds contained in the dilute hydrochloric acid extract of feeding materials (E. S. R., 15, p. 496) was further studied with the corn grain, wheat seed, oat seed, barley seed, ruta-bagas, and cured alfalfa hay.

In the instance of the oat, corn, and barley seed an effort was made to study the distribution and nature of the phytin and phytic acid, these being extracted in each case and the phytic acid decomposition products studied. It was found that phytin was present in the seeds of corn, oats, and barley, but its presence could not be detected in either alfalfa hay or ruta-bagas. Its distribution in the seeds studied differs from that in wheat, in that it is found throughout the entire seed, whereas in wheat it exists mostly in the outer layers.

An approximate estimation of the phosphorus in the extract showed from 38 to 48 per cent of that in the seeds. With ruta-bagas 64 per cent of the total was inorganic phosphorus. There was also present a phosphorus compound of unknown constitution, which was soluble in dilute acids, free from nitrogen, hydrolyzable, and which gave 24 per cent of the phosphorus contained in the root. Alfalfa hay cut as it was coming into bloom yielded 63 per cent of its total phosphorus in inorganic forms. When separated by the modified Posternak method, the dilute acid extract also contained a nitrogen-free organic phosphorus complex. This yielded reducing bodies on hydrolysis with acids, but did not produce inosit, and could therefore not be classed with phytic acid. It contains 17 per cent of the total phosphorus of the plant. The reducing substance formed on hydrolysis may possibly be dextrose.

The occurrence of phosphatids in vegetable and animal substances, H. Vageler (*Biochem. Ztschr., 17 (1909), No. 1–3, pp. 189–219*).—The author discusses the characteristics and the occurrence of lecithin, and describes a method for its determination, as follows: The finely ground material is extracted with 800 gm. of 94 per cent alcohol in the reflux condenser apparatus for 2 hours. A second extraction is made with 800 gm. of alcohol for 8 hours, the extracts from the 2 extractions combined, heated to 50° C., and 400 gm. weighed out for distillation. The residue from the distillation serves for the determination of phosphoric acid. The most accurate method for the oxidation of the residue was found in dissolving it in sodium hydroxid, transferring it to a Schott bottle and oxidizing with 50 cc. concentrated sulphuric acid. The catalytic substance employed was copper filings.

The results obtained with plants show that lecithin is present in a greater proportion in the fresh green parts than in the blossoms. There is a greater accumulation of lecithin in the plant when blossoming and fructification is taking place, but at the time when the plant is in its most rapid stage of growth the lecithins are also present in abundance. There was a disintegration at the end of the vegetative period. It was also found that the lecithins were partly decomposed when evaporating the alcoholic extract.

As representatives of animal substances milk of various kinds, cheese, fish, horse and steer flesh were selected. With milk the phosphorus percentages calculated to dry substance were as follows: Cow's milk 0.05223 to 0.05534 (for 3.4 and 3.2 per cent of fat, respectively), centrifuged milk 0.0504 (for 0.2 per cent of fat), goat's milk 0.05 (for 4 per cent of fat), ass's milk 0.04398, and sheep's milk 0.05857 (for 7.5 per cent of fat). Milk heated for a short time to 100° yielded 0.0448 per cent of phosphorus. It can thus be seen that the phosphatids are present in larger amounts when the rate of growth of the young is greatest. Human milk had 0.027 per cent of organic phosphorus, and Tilsiter cheese with 23.33 per cent fat had 0.62686 per cent phosphorus. There is

evidently a decided disintegration of these organic phosphorus bodies during the process of ripening. Trout spawn contained 0.4153 per cent of phosphorus; pike spawn 0.4434 per cent. The phosphorus in horse flesh was 0.17 per cent, and that in steer flesh 0.138 per cent.

It is evident from the above researches that the phosphatids are not separated from the life processes of the plants. The same conclusion can be drawn from the results obtained with the animal substances.

The intracellular enzyms of lower fungi, especially those of Penicillium camemberti, A. W. Dox (*Jour. Biol. Chem., 6 (1909), No. 5, pp. 461–467*).—The enzyms en masse were prepared by cultivating on Czapek's media and extracted by the Buchner-Albert "acetondauerhefe" process, modified for molds. The powdered enzyms thus obtained were very stable when properly kept.

The main study was made upon the presence of proteases, nucleases, amidases, lipases, diastases, and emulsins, and those acting on hippuric acid. Proteases showed no activity with either fibrin, ovalbumin, and other native proteins. Digestion was apparent with casein, gelatin, and proteoses (Witte peptone), and in this respect was like the animal erepsin. The activity was greatest in phosphate media, either neutral or alkaline in reaction. Proteose solutions which give the biuret reaction when acted upon by this enzym show the tryptophan reaction. A nuclease was observed which was capable of liberating purins and phosphoric acid from yeast nuclein. The presence of amidases was demonstrated by the liberation of ammonia from such bodies as urea, asparagin, acetanilid, etc.

The several enzym preparations made from *P. camemberti*, *P. chrysogenum*, *P. brevicaule*, and *Aspergillus niger* hydrolyzed hippuric acid into benzoic acid and glycocol, and in this respect differ from animal erepsin. Emulsin was demonstrated by the decomposition of amygdalin, arbutin, and salicin. The lipase reactions were very feeble, but the author attributes this possibly to faulty manipulations, since the lipases are soluble in ether containing lipoid material. The carbohydrate decomposition phenomenon is somewhat complicated by the presence of carbohydrates in the fungi themselves, but the errors from this source were partially eliminated by employing small amounts of enzym and checking with blank autodigestion tests. Amylase, inulase, raffinase, sucrase, maltase, and lactase were identified.

The influence of boric acid on enzym action, H. Agulhon (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 20, pp. 1340–1342*).—The effect of boric acid upon pepsin, papain, sucrase, pancreatic and malt amylase, lipase, emulsin, trypsin, and invertase was studied.

It was found that boric acid had very little effect on the retardation of the enzymatic processes, except in the case of the enzyms contained in the fruit of the castor oil plant. It was even found in some instances that boric acid accelerated the enzym action when added in optimum quantities, and these were established by the author. Boric acid had no effect upon the proteolytic action of pepsin.

A new method for measuring the electrolytic dissociation of water, C. S. Hudson (*U. S. Dept. Agr., Bur. Chem. Circ. 45, pp. 2*).—This is the application of observations by the author and others with the mutarotation of glucose in acid, alkaline, and neutral solutions to the measurement of the electrolytic dissociation of water.

An improved method of desiccation with some applications to biological problems, L. F. Shackell (*Amer. Jour. Physiol., 24 (1909), No. 3, pp. 325–340*).—An improved method of vacuum desiccation is described which, in the author's tests, has given very satisfactory results.

"The improvements in the present method over ordinary methods of vacuum desiccation are (a) the very rapid production of extreme vacua with the so-called 'Geryk' type pump; (b) the freezing of the material prior to desiccation to obviate primarily any concentration of substances, and to a lesser degree shrinkage and hardening; (c) mixing of the sulphuric acid absorbent to prevent saturation of its exposed surface with its consequently greatly lessened efficiency.

"The method affords a comparatively rapid and exceedingly accurate means for determining water in various materials, especially such as can be frozen solidly. Because of the friability and porosity of such dried materials, the extract obtained by organic solvents can be secured with greater ease than by the usual method of extracting oven-dried materials or those that have been shriveled and hardened by ordinary methods of vacuum desiccation.

"Liquids need not be frozen for determinations of water, but can be absorbed on dry sand in proper containers. . . .

"Experiments so far indicate that all materials, especially those unstable substances associated with immunity work, can be desiccated as outlined and can be indefinitely preserved."

Concerning certain organic acids and acid anhydrids as standards in alkalimetry and acidimetry, I. K. PHELPS and L. H. WEED (*Amer. Jour. Sci., 4. ser., 26 (1908), p. 138; Chem. News, 100 (1909), No. 2588, pp. 3, 4*).—Succinic acid, succinic anhydrid, malonic acid, benzoic acid, phthalic anhydrid, and phthalic acid were prepared in a pure state by methods described and their efficiency tested as standards for alkalimetry and acidimetry.

The authors conclude that these substances may well be used as standards. For decinormal solutions of barium hydroxid they are even more accurate than the gravimetric determination of the barium as barium sulphate. In the pure state they serve as well as the hydrochloric acid standard for alkalimetry and acidimetry, but the authors recommend the use of the more soluble compounds, that is, the succinic and malonic acids, although the less soluble ones furnish equally accurate results.

A change in the Kjeldahl nitrogen method, J. SEBELLEN, A. BRYNILDSEN, and O. HAAVARDSHOLM (*Chem. Ztg., 33 (1909), Nos. 87, p. 785; 88, pp. 795, 796, figs. 3*).—The oxidation and digestion process is done with a special kryptol electric heating apparatus connected with the ordinary electric lighting system. The current employed is 110 volts and 1.7 amperes, which heats the flask up to a temperature of 200° C. in about 15 minutes, or the temperature can be brought up higher in a little longer time.

The usual method of hot distillation is dispensed with and Folin's recommendation for taking out the ammonia by suction is followed. The process is as follows: Two flasks, A and B, are necessary. A, which serves as a distilling flask, is a Florence flask, fitted with 2 tubes, one of which dips in the fluid to be distilled, and the other leads from the top of the bottle to the other flask, B. The tubes and stoppers are all of glass and the stoppers ground in. Flask B, which serves as the absorption bottle, contains the normal acid and is constructed on the same principle as flask A, from which it differs only in being cylindrical, wide-mouthed, and smaller. When the apparatus is connected air is aspirated through B for 2 hours, the amount of air going through corresponding to about 100 liters. For the liberation of the ammonia the usual sodium hydroxid is used with the addition of a little sodium sulphid. The apparatus can be used alone or in series.

Modified apparatus for estimation of nitrogen by the Kjeldahl process, F. E. WESTON and H. R. ELLIS (*Chem. News, 100 (1909), No. 2592, p. 50, fig. 1*).—A new form of Kjeldahl apparatus is described, the chief features of which are a bulb which prevents absorption of external ammonia, a thistle

tube which allows the gradual addition of the alkali solution without loss, and a means of connecting the apparatus with the suction pump to prevent bumping.

Some remarks about the determination of the total nitrogen by Mitscherlich's method, V. SCHENKE (*Chem. Ztg., 33 (1909), No. 78, pp. 712, 713*).—With reference to the claim of Mitscherlich and others that up to the time that the Mitscherlich method (E. S. R., 21, p. 208) was described no accurate method existed for the determination of nitrogen in small amounts, the author states that he published a method in 1896 (E. S. R., 8, p. 741) which meets the requirements.

Estimation of phosphoric acid in ashes, W. PLÜCKER (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 8, pp. 446–454; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 560, II, p. 518*).—The results obtained by von Lorenz's method (E. S. R., 13, p. 14) were found reliable. Iron, aluminum, and silica did not influence the results.

Determination of phosphoric acid (gravimetric molybdate method for the international trade of raw phosphates) (*Chem. News, 100 (1909), No. 2588, p. 1*).—A full description of the mode of analysis of raw phosphates proposed at the International Congress of Applied Chemistry.

Fuchsin S as a standard solution for the estimation of nitrites in water, J. H. KASTLE and E. ELVOVE (*Abs. in Chem. Ztg., 33 (1909), No. 69, pp. 626, 627*).—The instability of the iodin-chloroform solutions employed for the estimation of nitrites in water led the authors to look for a more stable reagent. Fuchsin S acidified with hydrochloric acid was found to possess nearly the same color and numerous tests gave favorable results.

Polarization and saccharimetry, D. SIDERSKY (*Polarisation et Saccharimétric. Paris [1908], 2. ed., rev. and enl., pp. 168, figs. 40*).—This is a manual on polarization and saccharimetry. The initial chapters of the book consider the physics of polarization and polarized light and the various kinds of instruments in use for polariscopy. The succeeding chapters are devoted to the determination of sugars, alkaloids, terpenes, sugar in urine, and resin in oils.

The details of a modified method for the hydrochloric acid extraction process in the polarimetric determination of starch, THORNE and JEFFENS (*Abs. in Chem. Ztg., 33 (1909), No. 69, p. 624*).—A modification of the Effront-Ost-Lintner method is suggested.

In this method 5 gm. of the material ground as fine as possible is rubbed up in a mortar with water until the mass ceases to cling to the side of the vessel, 20 cc. of water being generally required. About 40 cc. of hydrochloric acid of specific gravity 1.15 is added, amid constant stirring, until the mass swells and forms a viscous fluid. The mixture is allowed to stand for 10 minutes and then transferred to a 200 cc. flask, containing 10 cc. of a 4 per cent phosphotungstic acid and 20 cc. of hydrochloric acid. The mortar is washed out with dilute hydrochloric acid and the flask filled therewith to the 200 cc. mark. The flask is then shaken, the contents transferred to a wide-mouthed bottle, and the whole well shaken until a definite flocculent precipitate is obtained and the supernatant fluid is practically clear. The solution after filtration is ready for polarization. If the 200 mm. tube of the Schmidt-Haensch scale is employed with white light the percentage of starch is calculated by the formula $P=\frac{RX40}{11.6}$. The concentration of starch in this method never runs over specific gravity 1.1.

The determination of mannose, arabinose, xylose, and hydrolized milk sugar, R. O. HERZOG and F. HÖRTH (*Ztschr. Physiol. Chem., 60 (1909), No. 2, pp. 152–154; abs. in Chem. Zentbl., 1909, II, No. 1, pp. 67, 68*).—Thirty cc. of

sugar solution and 30 cc. of Fehling's solution are placed in a 150 cc. Erlenmeyer flask and diluted to a bulk of 100 cc. A stream of hydrogen is then passed through the solution for 20 minutes, during which the solution is heated on a boiling water bath. The cuprous oxid thus formed is then filtered into a Soxhlet tube, carefully washed with water, alcohol and ether and converted into the cupric state.

For hydrolyzing the milk sugar 50 cc. of a 1 per cent solution is taken, 1 cc. of concentrated sulphuric acid added, in a 250 cc. graduated flask, and the whole placed for 4 hours on the boiling water bath, cooled to room temperature, neutralized, and filled up to the graduation. For the analysis 30 cc. is employed. A table for the calculation concludes the article.

A method for the determination of the caramel content of sugar, EHRLICH (*Ztschr. Ver. Deut. Zuckerindus., 1909, No. 643, II, pp. 746–753*).—A coloring material termed "saccharan" which simulates the substances included under the general heading of "caramel," and which may be used as the standard for color determinations, was prepared by heating cane sugar in a Jena flask on an oil bath at 200° C. in vacuum and purifying. The substance obtained is a dark brown, homogeneous hard mass, soluble in water, and at a concentration of 1 to 10,000 gives an intensely dark brown solution. A kindred substance was obtained from maltose, but not from dextrose or fructose, even though these were together.

In the method proposed a 0.1 per cent saccharin solution in a 20 mm. polariscope tube on the glass plate side of a reconstructed Stammer color instrument is used.

A new color reaction for cholesterin, D. OTTOLENGHI (*Ric. Lab. Chim. Agr. R. Scuola Sup. Agr. Milano, 3 (1908), pp. 81–85*).—When a small fragment of cholesterin is dissolved in 1.5 cc. of alcohol, and 1 to 2 drops of a solution of 5 methyl-furfurol is added, and then an equal volume of strong sulphuric acid, a red color appears at the junction of the two liquids. The method is specific for cholesterin as far as such bodies like phytosterin are concerned.

The Bellier reaction for plant oils, A. OLIG and E. BRUST (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 10, pp. 561–584*).—The substances used were various kinds of poppy oil, cotton-sesame oil, stearin-sesame oil, sesame oil, corn oil, beet oil, cotton-seed oil, olive oil, cocoa fat, palm fat, and palm-seed fat, as well as an edible linseed oil. The general tests were made and, further, the degree of sensitiveness determined.

The Bellier test has been found to be well suited as a preliminary test. Like the Welmans test it represents a general test for all plant oils, but it is more sensitive and appears about 30 seconds sooner. The test is furthermore useful to detect additions of oleomargarine, tallow, etc., but it is probable that oils which have been so treated as not to change their external appearance render the reaction inactive. The authors recommend that the phytosterin test be carried on in conjunction with the Bellier method.

Official methods of food analysis, February, 1909 (*Méthodes Officielles pour l'Analyse des Denrées Alimentaires, Février, 1909. Paris: Ann. Falsif., 1909, pp. 82*).—The methods of analysis for the various foods are given in detail, with specific directions to the analyst for sampling, and for the interpretation and reporting of results. For many of the foods attention is called to the adulterations more commonly encountered.

The new legislation in regard to the adulteration and sale of foods and agricultural products, V. RICHARD (*La Nouvelle Législation sur la Repression des Fraudes dans la Vente des Marchandises et des Falsifications des Denrées Alimentaires et des Produits Agricoles. Paris, 1908, pp. II+270*).—A compilation of data as to the economic, social, historical, and legal aspects of the fraudu-

lent adulteration and sale of foods. A chapter treating of specific adulterations and definitions therefor is appended.

Recommendations for changes in the official methods for the analysis of sausage, A. REINSCH (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 1–2, pp. 36–54*).—A report presented at the meeting of German food chemists at Heidelberg, May, 1909, with the discussions.

A rapid sorting test for the detection of paraffin wax in lard, H. S. SHREWSBURY (*Analyst, 34 (1909), No. 401, p. 348*).—The test is as follows:

Measure 5 gm. of the melted lard in a cylinder, transfer to a 200 cc. Reichert flask, and saponify with 20 cc. of glycerol soda (made by mixing 100 cc. of 45.3 per cent sodium hydroxid solution with 500 cc. of glycerol). The hot mass thus obtained is dissolved in 50 cc. nonmineralized methylated spirit, which must be added cautiously drop by drop. A clear solution indicates an absence of paraffin. After standing the solution gelatinizes, and may again be observed. Genuine lard gives a slight opalescent appearance but the jelly is homogeneous.

The detection of starch sirup in honey and fruit juices, J. FIEHE (*Arb. K. Gsndhtsamt., 32 (1909), No. 1, pp. 218–222; Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 1–2, pp. 30–33*).—The author describes a new method for detecting starch sirup, and especially starch sirup dextrin in honey.

It was found that in the presence of hydrochloric acid dextrins from coniferous honey could not be precipitated with alcohol. Using this as a means of differentiation, an addition of only 5 per cent of starch sirup to pure bee honey could be detected, and with 2 samples of coniferous honey containing very much dextrin the presence of starch sirup could be determined with certainty.

The author also found the method well adapted to raspberry and cherry juices for starch sirup dextrin, providing certain modifications recommended are used.

Apparatus for use in the determination of volatile acids in wines and vinegars, H. C. GORE (*U. S. Dept. Agr., Bur. Chem. Circ. 44, pp. 2, fig. 1*).—The Hortvet-Sellier apparatus has been modified by substituting a copper flask for the outer glass flask, adding a constant feed apparatus, blowing a ridge in the inner flask to act as a sort of a shoulder for the rubber gasket, and eliminating the dropping funnel. The rate of flow within the flask from the reservoir is controlled from a small sight tube connected with the tube running from the reservoir.

Experiments made with this apparatus and tap water showed an amount of carbon dioxid equivalent to 0.3 cc. of tenth-normal alkali solution, using phenolphthalein as an indicator. With distilled water the error was equivalent to about 0.15 cc. This error is constant and is subtracted from all determinations.

The operation of the apparatus is described.

A volumetric method for the estimation of casein in cow's milk, E. B. HART (*Jour. Biol. Chem., 6 (1909), No. 5, pp. 445–451*).—In a 200 cc. Erlenmeyer flask place 10.5 cc. of the milk and 75 cc. of distilled water at ordinary temperature, add 1 to 1.5 cc. of a 10 per cent acetic acid solution and rotate the flask. The precipitate thus obtained is filtered through a 9 to 11 cm. filter and a fine stream of water is conducted on the uppermost point of contact of the filter, in order to accelerate filtration, and further to remove all loosely combined and free acetic acid. The particles of casein adhering to the walls of the Erlenmeyer flask need not be removed. The washing is continued until 250 to 300 cc. of filtrate are obtained, which should be perfectly clear.

After washing place the filter paper and contents with 75 to 80 cc. of neutral carbon-dioxid-free water and a few drops of phenolphthalein in the original Erlenmeyer flask and have the temperature of the mixture as near 20° C. as possible. Then add 10 cc. of tenth-normal potassium hydroxid solution, stopper the flask with a rubber stopper, and shake vigorously in order to obtain complete

solution of the casein particles. After all is dissolved, wash off the stopper with neutral distilled water and titrate directly with tenth-normal sulphuric acid solution. A blank test should be run in each instance, as in the experience of the author a blank of 0.2 to 0.3 cc. was invariably obtained. The difference between the corrected acid reading and the 10 cc. of alkali gives directly the percentage of casein in the milk.

A rapid method for the estimation of fat in homogenized milk, HÖYBERG (*Ztschr. Fleisch u. Milchhyg., 19 (1909), No. 10, pp. 352–355*).—The fat content of homogenized milk can not be determined accurately by the usual Gerber method. Good results can be obtained by heating the milk in a water bath at 60 to 65° C. for 5 minutes before applying the test. The author recommends the direct addition of the warm milk to the sulphuric acid and the amyl alcohol, and to avoid pouring the former on the sides of the butyrometer.

Comparative investigations on the newer methods for the detection of the addition of water to milk, CORNALBA (*Abs. in Chem. Ztg., 33 (1909), No. 69 p. 628*).—The refractometric, densimetric, and cryoscopic methods are discussed. With the refractometric method accurate results are obtained for casein and fat only when these are present in large amounts. The density determination of the serum will furnish accurate results for dilutions of the milk down to 10 per cent. The freezing point method did not give good results.

Detection and determination of formaldehyde in milk, L. GRÜNHUT (*Ztschr. Analyt. Chem., 48 (1909), No. 7–8, pp. 502–506*).—A compilation of methods.

Observations with the Schardinger reaction of milk, K. SCHERN (*Biochem. Ztschr., 18 (1909), No. 3–5, pp. 261–284*).—It is shown that milk from cows in the first stages of lactation did not always give the Schardinger reaction when treated at Brand's temperature, 65 to 70° C.

With cows which had been recently suckled no reaction was apparent, while those where the calves had died reacted readily. A cow in the early stages of lactation with one quarter inflamed gave a milk from that quarter which decolorized. Another cow, with no inflamed quarter but whose calf died, gave milk at first which was decolorized in the bottom of the test tube while the upper layers remained blue, but the milk obtained on the next day was decolorized completely. The author concludes from this that the feeding of the offspring has some influence on the reaction. Experiments made with cows in late periods of lactation showed that in almost every instance the reaction was present. An attempt to determine whether the reaction could be employed to detect pathogenic milks was unsuccessful.

The coloration was found to set in better at 45° with milks from the first stages of lactation, while the optimum for milks from late periods of lactation was 65 to 70°. With the milks from late periods of lactation the bodies which brought about the Schardinger reaction were present in a preformed state, but with those from the early stages they were mostly not present at all.

The enzyms of milk, F. BORDAS and F. TOUPLAIN (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 16, pp. 1057–1059; abs. in Chem. Zentbl., 1909, I, No. 26, pp. 2005, 2006*).—The relation of the decomposition of hydrogen peroxid and the color reaction to the presence of peroxydases and catalases was not established.

When samples of milk which had been heated to 80, 100, and 120° C., respectively, and did not give the Storch reaction, were centrifuged 3 layers were obtained, the upper being cream; the middle, fluid; and the lowest, sediment. The cream layer and the sediment then gave the reaction, while the fluid did not. Raw milk filtered through a bisque filter did not give the reaction, and

casein from raw milk boiled with this filtrate (without kneading the casein) did not decompose hydrogen peroxid.

On adding to boiled milk which contains Storch reagent a few pieces of pumice, and slightly heating, a reaction took place. The decomposition of hydrogen peroxid is brought about by the calcium caseinate, and the reason for the reaction not appearing with boiled milk in general is that the l-casein of Duclaux precipitates and envelops the suspended casein and forms a sort of film which prevents reaction.

The preservation of milk samples, C. GIRARD (*Abs. in Chem. Ztg., 33 (1909), No. 66, pp. 586*).—Milk preserved with potassium bichromate very often gives erroneous results, the accuracy depending upon the degree of freshness of the milk. It was often found that milk to which potassium bichromate had been added was totally decomposed within 1 or 2 months after taking the sample, and that a diminution of fat and casein had taken place. The results of the analyses showed the alterations more definitely when the milk was evaporated on the water bath. The lactose was oxydized by the bichromate to the extent of 25 per cent.

The determination of sugar in molasses feeds, M. GONNERMANN (*Centbl. Zuckerindus., 17 (1909), No. 43, p. 1246*).—A discussion of the methods of the author and others, previously noted from another source (E. S. R., 21, p. 307).

Report of the agricultural-chemical control station of the agricultural chamber for the Province of Saxony at Halle for 1908, H. C. MÜLLER (*Ber. Agr. Chem. Kontroll-stat. Halle, 1908, pp. 75*).—A description and summary of the work during 1908.

Fermentation of sauerkraut with pure cultures, T. GRUBER (*Centbl. Bakt. [etc.], 2. Abt., 22 (1909), No. 18–23, pp. 555–559*).—The type of organism selected for this fermentation is known as *Pseudomonas brassicæ acidæ*, which was originally found growing on cabbage. The cultures are grown in a watery infusion of cabbage leaves and then inoculated into the salted and shredded cabbage.

A new method to restore the green color and luster of dried peas, A. PAGNIELLO (*Bol. Chim. Farm., 48 (1909), pp. 187–194; abs. in Chem. Zentbl., 1909, I, No. 26, p. 2006*).—Peas were colored with chlorophyll and coated with dextrin to restore the color and luster.

The limit of lead in vessels employed to preserve food stuffs, PADE and KOHN (*Abs. in Chem. Ztg., 33 (1909), No. 66, p. 586*).—Lead is deemed absolutely necessary in the tinning of these vessels, but the limit must not exceed 5 per cent. Tin-plate vessels must be coated with pure tin, the lead content of which must not be over 0.5 per cent, and that of arsenic not above 0.00001 per cent.

METEOROLOGY—WATER.

Meteorology, E. KLEINSCHMIDT (*Jahrb. Naturw., 24 (1908–9), pp. 112–146*).—This is a review of progress in the study of aerology, solar radiation, composition of the atmosphere, atmospheric electricity, terrestrial magnetism, weather forecasting, aviation, and other subjects related to meteorology.

Monthly Weather Review (*Mo. Weather Rev., 37 (1909), Nos. 3, pp. 85–124, figs. 12, charts 9; 4, pp. 125–172, figs. 9, charts 9*).—In addition to the usual reports on forecasts, warnings, weather and crop conditions, meteorological tables and charts for the months of March and April, 1909, recent papers bearing on meteorology and seismology, recent additions to the Weather Bureau library, Weather Bureau men as educators, etc., these numbers contain A Chronological Outline of the History of Meteorology in the United States,

An Annotated Bibliography of Evaporation, by Mrs. G. J. Livingston, and the following articles and notes:

No. 3.—Weather Bureau Kiosks (illus.), by D. T. Maring; Suggested Reforms in Meteorological Methods, by M. E. J. Gheury; Adopt the Kelvin Thermometer Scale and the Metric System, by H. H. Clayton; Express all Barometric Measurements by Ordinary General Units of Force, by W. Koeppen, trans. by C. Abbe, jr.; Meteorlogical Registrations in Samoa, 1902–1906—I, Winds (illus.), by O. Tetens; Meteorological Observatory at Teneriffe; Argentine Weather (illus.), by H. L. Solyom; The Specific Gravity of Snow, by M. E. J. Gheury; Changes in the *Monthly Weather Review;* Meteorology in the Schools; Weather Bureau Meteorological Charts of the Oceans; The Cuthbert, Ga., Tornado, by C. F. von Herrmann; Tornadoes in Alabama, by F. P. Chaffee; Severe Winds in South Carolina; Tornadoes in Texas; Sleet Storm in Ohio; Tornadoes in Mississippi; and Waterspouts on the Atlantic Coast.

No. 4.—The Clouds of Venus and Their Significance (illus.), by A. W. Clayden; [The April Moon and the weather]; Scientific Trespass; What is the Chinook Wind? Reform in Meteorological Methods; Northers of the Sacramento Valley, by T. A. Blair; The Force of Gravity at the Earth's Surface; Meteorology at Harvard College Observatory; Meteorology as a Study for Practical Men; The Relation of the Movements of the High Clouds to Cyclones in the West Indies (illus.), by J. F. Quinn; Methods and Apparatus for the Observation and Study of Evaporation (illus.), by C. F. Marvin; High Winds in Ohio, by J. W. Smith; Snowballs and Water Equivalents in New York; Tornado in Illinois; Tornadoes in Kansas; Tornadoes in Tennessee (illus.), by H. C. Bate; Tornadoes in Mississippi, by W. S. Belden; Severe Local Storm at Cleveland, Ohio (illus.), by J. Kenealy; Tornado in Alabama, by E. C. Horton; Tornadoes in Arkansas (illus.); Red Snow in Michigan, by A. Wiesner; and The Aurora of May 15–16, 1909.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. Ostrander and R. C. Lindblad (*Massachusetts Sta. Met. Buls. 247, 248, pp. 4 each*).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during July and August, 1909, are given. The data are briefly discussed in general notes on the weather of each month.

Meteorological records for 1908 (*New York State Sta. Rpt. 1908, pp. 527–537*).—Tables are given showing tridaily readings of the standard air thermometer during each month of 1908; daily readings of maximum and minimum thermometers at 5 p. m. for each month of the year; a monthly summary of maximum, minimum, and standard thermometer readings; average monthly and yearly temperatures since 1882; monthly and yearly maximum and minimum temperatures from 1883 to 1908, inclusive; and rainfall by months since 1882.

Texas climate (*Texas Dept. Agr. Bul. 8, pp. 288–314*).—Data with reference to the climatic features of southern and western Texas are summarized and the principal climatic features of the regions are described. A summary is also given of data for precipitation in the Panhandle region of Texas.

Lightning and lightning conductors, A. J. Henry (*U. S. Dept. Agr., Farmers' Bul. 367, pp. 29, figs. 3*).—This bulletin "contains information respecting the phenomena of lightning in general and suggests means of protecting farm buildings from destructive lightning strokes."

Papers on the conservation of water resources (*U. S. Geol. Survey, Water-Supply Paper No. 234, pp. 96, dgms. 8, maps 2*).—This pamphlet contains a reprint of the following selected papers written by the members of the Geological Survey for the report of the National Conservation Commission: Distribution

of Rainfall, by H. Gannett; Floods, by M. O. Leighton; Developed Water Powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped Water Powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground Waters, by W. C. Mendenhall; Denudation, by R. B. Dole and H. Stabler; and Control of Catchment Areas, by H. N. Parker.

Chemical composition of Nile waters, W. Beam (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 386–395*).—The suspended matter carried by the Nile and its tributaries, as well as the chemical composition of the water at different periods, are reported and discussed, special attention being given to the factors (particularly soluble alkaline salts) controlling the amount of suspended matter.

On the silt deposit of some rivers in the Serajoe Valley, E. C. J. Mohr (*Meded. Dept. Landb. [Dutch East Indies], 1908, No. 5, pp. 95, pl. 1, dgms. 5, map 1*).—This comprehensive report describes the local features and physical characteristics of the more important tributaries of the Serajoe, and gives the results of investigations of the waters of these tributaries and of the Serajoe at different points. The examination of the waters included the determination of the silt content; the relation between silt content and stream height, rate of flow, discharge, and rainfall; mechanical analysis of the silt; character of silt (white and brown); and chemical analysis of the silt and of the water.

The conclusions drawn are chiefly local in their application. From a comparison of the amounts of potash, lime, and phosphoric acid found in the water and in the silt, the conclusion is drawn that more available plant food comes upon the fields in solution in the irrigation water than in the silt.

The purification of drinking water with chlorin or hypochlorites, Thresh (*Österr. Chem. Ztg., 12 (1909), No. 16, pp. 207, 208; Chem. Ztg., 33 (1909), No. 69, p. 626*).—Investigation showed that water to which the addition of 1 part of chlorin to 1,000,000 parts of water was made was practically sterile, and that the cost involved for the process was very light. The chlorin was mostly removed by filtration through a bed having a very thin layer of iron or a slightly thicker one of aluminum.

SOILS—FERTILIZERS.

Soil moisture investigations, E. Nelson (*Idaho Sta. Rpt. 1908, pp. 29–37*).—Observations on the effect of fall irrigation on soil moisture are reported, which show that there was a considerable loss of moisture from fall irrigated land during the winter and that it is possible to store only a limited amount of moisture in the soil by means of fall irrigation. Tests of the effect of subsoiling on soil moisture gave inconclusive results.

Experiments in cropping alternate years, with a summer fallow intervening, showed that little moisture was lost from the soil in case of the summer fallow when a dry soil mulch was maintained on the surface of the soil. Incidentally chemical analyses of the surface soil, subsoil, hardpan, and clay on the farm of the substation at Caldwell, at which the above experiments were made, are reported, as well as data for precipitation during 1908 and weekly observations on evaporation from March 17 to October 12, 1908.

Field operations of the Bureau of Soils, 1906 (eighth report), M. Whitney et al. (*U. S. Dept. Agr., Field Operations of the Bureau of Soils, 1906, pp. 1033, figs. 34, maps 35*).—This report contains a general review of the work of the Bureau of Soils during 1906, by the Chief of the Bureau, together with detailed accounts of the following surveys:

Merrimack County, N. H., by C. N. Mooney, H. L. Westover, and F. Bennett; Niagara County, N. Y., E. O. Fippin, G. B. Jones, W. J. Geib, O. L. Ayrs, and

C. W. Mann; Madison County, N. Y., by M. E. Carr, A. M. Griffin, and O. Lee, jr.; Wheeling area, W. Va., by T. A. Caine and G. W. Tailby, jr.; Chesterfield County, Va., by F. Bennett, R. A. Winston, W. J. Geib, and C. W. Mann; Chowan and Transylvania counties, N. C., by W. E. Hearn and G. M. MacNider; New Hanover County, N. C., by J. A. Drake and H. L. Belden; Waycross area, Ga., by M. E. Carr and W. E. Tharp; Escambia County, Fla., by A. M. Griffen, J. A. Drake, H. L. Belden, and L. A. Kolbe; Lee County, Ala., by W. E. Hearn and W. J. Geib; Montgomery County, Miss., by T. A. Caine and F. C. Schroeder; Pontotoc County, Miss., by F. Bennett and R. A. Winston; Caddo Parish, La., by J. L. Burgess, L. A. Hurst, H. J. Wilder, and C. F. Shaw; Henderson area, Texas, by C. W. Ely and A. E. Kocher; Laredo area, Texas, by A. W. Mangum and O. Lee jr.; San Marcos area, Texas, by A. W. Mangum and W. S. Lyman; Tishomingo area, Ind. T., by T. D. Rice and O. L. Ayrs; Oklahoma County, Okla., by W. E. McLendon and G. B. Jones; Fayetteville area, Ark., by H. J. Wilder and C. F. Shaw; Prairie County, Ark., by W. T. Carter, jr., F. N. Meeker, H. C. Smith, and E. L. Worthen; Grainger County, Tenn., by W. E. McLendon and W. S. Lyman; Madison County, Tenn., by W. S. Lyman, F. Bennett, and W. E. McLendon; Meigs County, Ohio, by F. N. Meeker and G. W. Tailby, jr.; Cass County, Mich., by W. J. Geib; Greene County, Ind., by W. E. Tharp and C. J. Mann; Racine County, Wis., by G. B. Jones and O. L. Ayrs; Blue Earth County, Minn., by H. H. Bennett and L. A. Hurst; Crookston area, Minn., by A. W. Mangum and F. C. Schroeder; Putnam County, Mo., by C. J. Mann and W. E. Tharp; Riley County, Kans., by W. T. Carter, jr., and H. C. Smith; Lancaster County, Nebr., by J. L. Burgess and E. L. Worthen; Ransom County, N. Dak., by C. W. Ely, R. E. Willard, and J. T. Weaver; and Williston area, N. Dak., by T. D. Rice, R. E. Willard, and J. T. Weaver.

During the calendar year 1906, 20,243 square miles, or 12,955,520 acres, were surveyed and mapped on a scale of 1 in. to the mile, making the total area surveyed and mapped up to the end of that year 130,330 square miles, or 83,411,200 acres. The average cost of the field work in 1906 was $2.93 per square mile.

Field operations of the Bureau of Soils, 1907 (ninth report), M. WHITNEY ET AL. (*U. S. Dept. Agr., Field Operations of the Bureau of Soils, 1907, pp. 1062, pls. 4, figs. 36, maps 35*).—This report contains a general review of the work of the Bureau of Soils during 1907, by the Chief of the Bureau, together with detailed accounts of the following surveys:

Dutchess County, N. Y., by C. N. Mooney and H. L. Belden; Johnstown area, Pa., by C. J. Mann and H. C. Smith; Easton area, Md., by H. H. Bennett, W. E. Tharp, W. S. Lyman, and H. L. Westover; Middlebourne area, W. Va., by T. A. Caine, E. R. Allen, H. Jennings, and G. W. Tailby, jr.; Montgomery County, Va., by R. A. Winston and O. Lee, jr.; Henderson and Edgecombe counties, N. C., by W. E. Hearn and G. M. MacNider; Oconee County, S. C., by W. E. McLendon and W. J. Latimer; Sumter County, S. C., by F. Bennett, G. W. Tailby, jr., J. L. Burgess, G. B. Jones, W. J. Latimer, and H. L. Westover; Lee County, S. C., by F. Bennett, G. W. Tailby, jr., J. L. Burgess, W. J. Latimer, and H. L. Westover; Jefferson County, Fla., by G. B. Jones, W. E. Tharp, and H. L. Belden; Marion County, Ala., by O. L. Ayrs, E. R. Allen, A. E. Kocher, and H. L. Westover; Talladega County, Ala., by C. N. Mooney and C. J. Mann; Butler County, Ala., by A. E. Kocher and H. L. Westover; Oktibbeha County, Miss., by W. E. McLendon and L. A. Hurst; Prentiss County, Miss., by W. J. Geib and C. W. Mann; Jasper County, Miss., by E. L. Worthen and H. Jennings; Winn Parish, La., by T. A. Caine, H. L. Belden, and L. L. Lee; Robertson County, Texas, by H. H. Bennett and C. F. Shaw; Wilson County, Tex., by W. S. Lyman and F. C. Schroeder; Bastrop County, Tex., by R. A. Winston, F. N. Meeker, O. L.

Eckman, W. S. Lyman, F. C. Schroeder, T. D. Rice, and H. C. Smith; Brownsville area, Texas, by A. W. Mangum and O. Lee, jr.; Cooper area, Texas, by T. D. Rice and H. C. Smith; Conway County, Ark., by J. L. Burgess and C. W. Ely; Giles County, Tenn., by O. L. Ayrs and M. W. Gray; Marion County, Ind., by W. J. Geib and F. C. Schroeder; North Platte area, Nebr., by E. L. Worthen and O. L. Eckman; Morton area, N. Dak., by T. D. Rice, R. Babcock, and J. T. Weaver; McKenzie area, N. Dak., by A. E. Kocher and R. P. Stevens; Bellefourche area, S. Dak., and Minidoka area, Idaho, by A. T. Strahorn and C. W. Mann; Colusa area, Cal., by M. H. Lapham, A. T. Sweet, A. T. Strahorn, and L. C. Holmes; Redding area, Cal., by M. H. Lapham and L. C. Holmes; Butte Valley, Siskiyou County, Cal., by W. W. Mackie; and Bellingham area, Wash., by A. W. Mangum and L. A. Hurst.

During the calendar year 1907, 19,471 square miles, or 12,461,440 acres, were surveyed and mapped on a scale of 1 in. to the mile, making the total area surveyed and mapped up to the end of that year 149,801 square miles, or 95,872,640 acres. The average cost of the field work in 1907 was $3.29 per square mile.

A development of the soil survey work during the year was the undertaking of surveys in connection with the federal reclamation projects, including the Minidoka project in southern Idaho and the Bellefourche project in western South Dakota.

General classification of Florida soils (*Fla. Quart. Bul. Agr. Dept., 19 (1909), No. 3, pp. 25–36*).—Descriptions are given of the principal types of Florida soils, classified as first, second, and third rate pine lands, high hammock and low hammock lands, and swamp lands.

Soils, R. D. Watt (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 259–265*).—Analyses of a number of samples of soils from different parts of the Transvaal are reported, the results in general confirming the conclusions from previous investigations that the soils of the Transvaal are as a rule poor in phosphoric acid, lime, and nitrogenous organic matter, but moderately rich in potash.

Nitrification in Transvaal soils, R. D. Watt (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 274–277*).—Studies of the rate of nitrification in culture solutions inoculated with Transvaal soils are reported, indicating that during the summer, with a fair amount of moisture in the soil and a higher day and night temperature than in England, nitrification is more rapid in the Transvaal soils than in those of England. As a rule the solutions nitrified most rapidly when inoculated with soils rich in both organic matter and carbonate of lime, but even in poor sandy soils containing very little organic matter and only a trace of lime nitrification was more rapid than in good English soil.

Nitrifying bacteria in North Carolina soils, K. F. Kellerman and T. R. Robinson (*Science, n. ser., 30 (1909), No. 769, pp. 413, 414*).—Referring to investigations by Stevens and Withers on nonnitrifying soils in North Carolina (E. S. R., 21, p. 22), the authors report studies of a large number of North Carolina soils which substantiate the conclusion "that nitrification is at a rather low ebb in North Carolina soils, yet nitrifying bacteria are generally present, and if supplied with suitable food would undoubtedly soon multiply sufficiently to cause a normal rate of nitrification."

Studies in soil bacteriology. II. Ammonification in soils and in solutions, F. L. Stevens, W. A. Withers, et al. (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 21–25, pp. 776–785*).—The studies reported in this article were made by bacteriological methods similar to those used in investigations on nitrification previously noted (E. S. R., 21, p. 118).

The general purpose of the investigations was to ascertain whether reliable conclusions regarding the ammonifying power of a soil can be had by a study of its effect when inoculated into solutions. The general conclusion is that

neither the absolute nor the relative ammonifying power of the soil organisms experimented with (*Bacillus subtilis*, *B. mycoides*, and various soil complexes) can be ascertained by testing them in solutions. Even the relative ammonifying power of two soils or two organisms can not be determined with certainty by this method. Some bacterial soil complexes ammonify faster in solutions and some ammonify faster in soils. "Some pure cultures of organisms ammonify faster in soils, others faster in solutions. The rank of soils, bacterial soil complexes, or of pure cultures is different as measured in soils or in solutions."

The assimilation of ammoniacal, nitrate, and amid nitrogen by microorganisms, S. Bierema (*Centbl. Bakt.* [*etc.*], *2. Abt., 23 (1909), No. 21–25, pp. 672–726; abs. in Jour. Chem. Soc.* [*London*], *96 (1909), No. 562, II, pp. 692, 693*).—Experiments with a great variety of sources of nitrogen and of carbon, and of manure and soil organisms, in pure and mixed cultures, are reported and the results discussed in detail.

Sodium nitrate was readily assimilated in the presence of sucrose, glycerol, and calcium lactate, less readily in presence of levulose, starch, maltose, and calcium succinate. Ammonium nitrate was less readily assimilated in all cases than sodium nitrate, and magnesium-ammonium phosphate appeared to be the best source of nitrogen tested in these experiments. Formamid and acetamid were not readily assimilated, but the latter was capable of supplying both nitrogen and carbon. Guanidin carbonate alone was not actively assimilated, but was somewhat more readily taken up in the presence of calcium lactate, sucrose, and glycerol. Uric acid was completely converted into ammonium carbonate, but less readily into urea. Leucin and tyrosin, especially the first, were readily assimilated. Ammonium formate was slightly assimilated, ammonium acetate more readily, especially in presence of dextrose, and ammonium butyrate still more readily assimilated.

Comparative studies of the bacteria content of cultivated soils in relation to external influences, D. Engberding (*Centbl. Bakt.* [*etc.*], *2. Abt., 23 (1909), No. 21–25, pp. 569–642*).—Studies of the influence of the methods of making the counts, the culture medium, the strength of the original seeding, moisture, temperature, cultivation, and organic matter of the soil, and mineral fertilizers are reported.

The moisture content seemed to have more influence on the bacteria content of the soil than temperature. The addition of readily assimilable carbohydrates increased the bacteria content to a marked extent. The influence of mineral fertilizers was variable. Ammonium sulphate, sodium nitrate, potassium sulphate, and caustic lime in liberal amounts increased the bacteria content slightly. Magnesium sulphate caused a moderate increase. The influence of the mineral fertilizers on the bacteria content was in general the reverse of their effect on nitrogen fixation.

Soil disinfection in agriculture, O. Loew (*Porto Rico Sta. Circ. 11, pp. 3–12*).—This circular deals with the effect of chemical disinfectants, more particularly carbon bisulphid, upon the fertility of soils. Attention is called to the fact that there are in Porto Rico certain cases of sick or tired soils which are not benefited by the application of ordinary fertilizers. A series of experiments with carbon bisulphid and creolin has been started on certain of these soils.

All agricultural wealth from the soil, T. Cherry (*Rpt. Austral. Assoc. Adv. Sci., 11 (1907), pp. 227–232*).—This is part of an address before the Australasian Association for the Advancement of Science in The Outlook for Agriculture, discussing briefly the productiveness and potential fertility of soils in general, describing the peculiarity of Australian soils on the basis of the average results of analyses of 186 samples of Victorian soils, and explaining the importance of live stock in the maintenance of soil fertility.

The conservation of our natural resources, especially with reference to the soil, C. R. VAN HISE (*Proc. Ann. Conv. Farmers' Nat. Cong. U. S., 28 (1908), pp. 43–50*).—The causes of declining fertility are briefly discussed and the sources of supply of fertilizing materials are described.

Fertilizers and milk production, P. PIPERS (*Cultura, 21 (1909), No. 250, pp. 332–347*).—Experiments with chemical fertilizers on grass land in nine different localities in Holland were made to determine the effect of such fertilizers on the quantity and quality of the crop. The fertilizers used were 445 lbs. of superphosphate and a like amount of potash salt per acre, and one plat received in addition 134 lbs. of nitrate of soda per acre.

It was found that nitrate of soda produced a greater increase in the amount of hay than the superphosphate and potash. Not only was the total amount of raw and digestible protein increased by the use of chemical fertilizers but also the percentages of protein, fat and mineral constituents in the hay. The percentage of carbohydrates was practically unchanged. The percentage of fiber was slightly increased, but the proportion between the fiber and the protein and fat was lowered.

General conclusions are drawn as follows: In Holland and Belgium grass lands occupy an important place; the use of chemical fertilizers increases and improves the crop from these lands; the milk production is increased and improved by the increase and improvement of the hay crop; therefore, the national wealth would be increased by the proper use of chemical fertilizers.

Investigations on the fertilizer requirements of different soils, O. KELLNER (*Sächs. Landw. Ztschr., 57 (1909), No. 25, pp. 468, 469*).—This article gives in brief the results of systematic pot experiments to determine the fertilizer requirements of samples of soil from different parts of the Kingdom of Saxony.

The diffusion of saline fertilizers in the soil, A. MÜNTZ and H. GAUDECHON (*Ann. Sci. Agron., 3. ser., 4 (1909), I, Nos. 5, pp. 379–400, figs. 22; 6, pp. 401–411, figs. 8*).—This has already been noted from other sources (E. S. R., 21, p. 23).

Some improvements in sand culture, T. TAKEUCHI (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 197–202, pls. 3*).—Comparative tests with rice, oats, barley, and wheat, of Hellriegel's culture solution and of modifications proposed by the author are reported. With a view to decreasing the amount of soluble salts, supplying insoluble ingredients readily available to plants, and securing a neutral reaction as far as possible during the period of growth, the author uses nitrogen in the form of ammonium nitrate, phosphoric acid as a mixture of monopotassium and dipotassium phosphate, lime and magnesia as finely ground natural carbonates in a favorable ratio for common cereals, a small amount of gypsum and sodium chlorid, and iron as ferric hydroxid.

The fixation of atmospheric nitrogen, P. VAGELER (*Die Bindung des atmosphärischen Stickstoffes in Natur und Technik. Brunswick, 1908, pp. 132, pls. 5, figs. 11*).—This book treats briefly of the principal sources of combined nitrogen, the fixation of nitrogen without the intervention of organisms, the fixation of atmospheric nitrogen by free living bacteria, the fixation of nitrogen by bacteria and other micro-organisms in symbiosis with green plants, inoculation of the soil with tubercle bacteria, leguminous plants as nitrogen collectors in practice, and the fixation of atmospheric nitrogen by technical processes.

The technical utilization of atmospheric nitrogen, E. DONATH and K. FRENZEL (*Die technische Ausnutzung des atmosphärischen Stickstoffes. Leipsic and Vienna, 1907, p. V+250, figs. 69*).—This book treats of the chemical and physical methods of preparing nitrogen compounds from the air, the theory and practice of nitrogen combustion, the synthesis of ammonia from its elements, nitrids and their use in making ammonia, and cyan compounds from the air.

The manufacture of nitrates from the atmosphere by the electric arc. S. EYDE (*Jour. Roy. Soc. Arts, 57 (1909), No. 2949, pp. 567–576, figs. 2*).—The general features of the Birkeland and Eyde process are explained, the plant at Notodden is described, and the results of tests of the product as a fertilizer are summarized. Attention is called to the fact that the process may be adapted to the manufacture of a number of other products beside nitrate of lime, including nitrite of soda, nitric acid, ammonium nitrate, potassium nitrate, etc. It is also stated that a less hygroscopic product is now prepared than at the beginning of operations. The author was not prepared to give definite information as to cost of production.

The present status of production of synthetic nitrogenous fertilizers, G. RAGONDET (*Ann. Gembloux, 19 (1909), No. 7, pp. 444–447, figs. 2*).—In continuation of a previous article on this subject (E. S. R., 21, p. 221), descriptions are given of the arrangement of the apparatus and machinery used in the manufacture of nitrate of lime and nitrolime (calcium cyanamid).

Lime nitrogen, F. SCHUSTER (*Jahrb. Naturw., 24 (1908–9), pp. 249–252*).—Recent investigations relating to this material are briefly reviewed.

On the application of dicyandiamid as a nitrogenous manure, R. INOUYE (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 193–196, pl. 1*).—Pot experiments with rape and barley are reported which indicate that dicyandiamid may be used at the rate of 0.35 gm. of nitrogen per 8 kg. of soil with beneficial effect as a fertilizer. Apparently the best results are obtained by applying the material as a top-dressing.

On manuring with dicyandiamid, K. ASO (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 211–222, pl. 1*).—A number of experiments with oats and rice are reported from which the conclusion is drawn that "in water culture, dicyandiamid at the concentration of 0.01 per cent proved to be a source of nitrogen for plants. In common soil, however, it acted poisonously at the rate of 5 gm. dicyandiamid in 10 kg. soil, but served as a favorable nitrogenous manure with the reduced quantities. In paddy soil the injury was less than in the soil of common dry land and when the precaution was taken, that planting was performed three weeks after manuring with dicyandiamid, no injury whatever was observed and the harvest reached nearly that obtained with the equivalent quantity of ammonium sulphate and of lime nitrogen. . . . Dicyandiamid acted as a nitrogenous manure more favorably when it was applied in conjunction with alkaline manure."

Nitrate of soda or sulphate of ammonia, C. MAYER (*Agr. Jour. Cape Good Hope, 35 (1909), No. 1, pp. 24–27*).—The results of comparative tests of these fertilizing materials on a great variety of crops are summarized, with suggestions as to the use of sulphate of ammonia under the conditions prevailing in Cape of Good Hope.

Is dipotassium sulphate physiologically acid? K. ASO (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 223–225, pl. 1*).—Pot experiments with oats gave results indicating "that the physiological acidity of dipotassium sulphate is very much less pronounced than that of ammonium sulphate, but it acts as a neutral or weak physiologically acid manure."

On the manurial value of various organic phosphoric compounds. K. ASO and T. YOSHIDA (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 153–161, pl. 1*).—Lecithin, phytin, and nuclein prepared from rice bran were tested in comparison with sodium, aluminum, ferric, and tricalcium phosphate in a series of pot experiments with barley, peas, and rape. The following conclusions are drawn from the results:

"Among the organic phosphoric compounds used in these experiments, the manurial value of lecithin was highest, phytin came next, and nuclein last. The

manurial value of lecithin was not lower than that of sodium phosphate, that of phytin was nearly equivalent to that of ferric or aluminum phosphate, and that of nuclein was very low.

"The most essential phosphoric compound in vegetable manures is phytin. As phytin is easily transformed in soils into insoluble ferric and aluminum phosphate it is recommendable to use vegetable manures in a putrefied state to render the phosphoric acid available.

"In the analysis of manures, it is absolutely necessary to pay attention to the different organic phosphoric compounds."

On the different forms of phosphoric acid in organic manures, S. Tsuda (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 167–170*).—Studies of the forms of phosphoric acid in soy-bean cake, rape-seed cake, red-clover hay, herring guano, steamed bone dust, pressed cake of silkworm pupæ, and crab shells are reported.

In the animal manures the phosphoric acid was mostly in inorganic form (tricalcium phosphate), in the vegetable manures mainly in organic form. "In vegetable manures, phosphoric acid is present principally in the form of phytin and the amount of nuclein is comparatively small. Lecithin is also contained in small quantities, the phosphoric acid in this form being always less than 10 per cent of the whole. Again, as inorganic compounds phosphoric acid is present only in traces in certain cases."

On the availability of phosphoric acid in various forms in herring guano, R. Mitsuta (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 163–165, pl. 1*).—Herring guano, which had been extracted with various solvents to remove oil, lecithin, phytin, and the phosphates soluble in water and dilute acids, was tested in pot experiments with barley. The results indicate "that the principal part of phosphoric acid serving as phosphatic manure in fish guanos is of inorganic nature, chiefly consisting of calcium phosphate. Lecithin and phosphates soluble in water exert here also a certain rôle. . . . Nuclein in herring guano has no immediate manurial value as generally assumed."

Secondary calcium phosphate as a manure, T. Takeuchi (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 203–206*).—Sand cultures with rice are reported which indicate "that a great excess of carbonates of lime and magnesia can depress the absorption of phosphoric acid from secondary calcium phosphate so much that the formation of ears (with rice) becomes impossible. . . . Under certain conditions (probably when no or but little carbonates are present in soils) the secondary calcium phosphate is an excellent phosphatic manure, as Prianishnikov [E. S. R., 13, p. 934] has shown."

Phosphates in Germany, R. P. Skinner (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3591, pp. 1, 2; Mo. Cons. and Trade Rpts. [U. S.], 1909, No. 349, pp. 183, 184*).—A brief account is given of the general principles underlying the methods of manufacture of superphosphates, and a machine for use in the reduction of mineral phosphates with sulphuric acid is described.

The superphosphate industry in Italy, A. Menozzi and G. Gianoli (*Ric. Lab. Chim. Agr. R. Scuola Sup. Agr. Milano, 3 (1908), pp. 87–95*).—This is a brief sketch of the rise and development of the manufacture and use of superphosphates in Italy. The first factory was opened in 1867, but owing to the lack of agricultural information the product had to be sold in Marseilles. In 1908 there were 82 factories with a total annual production of 935,000 tons. The price of the phosphoric acid of the superphosphates decreased greatly in the 10 years preceding 1906; in that year it averaged about 3 cts. per pound.

Is artificial calcium carbonate more effective than limestone meal? H. YOKOYAMA (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 181, 182*).—The results of experiments with oats in sand cultures indicate that the artificial calcium carbonate was not more effective than fine-ground limestone.

On the lime factor for oats, J. N. SIRKER (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 183, 184*).—The results of sand cultures indicate that the best lime-magnesia ratio is 1:1 as in case of other cereals.

On the influence of different ratios of lime to magnesia on the growth of rice, II, K. ASO (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 171–173, pls. 3*).—The results of these experiments with calcium and magnesium sulphates confirm those of previous experiments with carbonates (E. S. R., 15, p. 1062). They show "that any change of the ratio CaO : MgO = 1 leads to a decrease of the harvest. The unfavorable effects of the sulphates upon the yield were more marked than those of the carbonates, probably on account of the slightly acid reaction in the soil."

On the influence of the ratio of lime to magnesia upon the yield in sand culture, K. ASO (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 175–180*).—The conclusions in brief from these experiments are as follows: "A certain favorable ratio of lime to magnesia for plant growth exists even in sand culture. Absolute excess of lime or magnesia, provided it be kept within certain limits, has no retarding effect on the development of the plants, the ratio between these bases being the chief factor for plant growth."

Some principles in manuring with lime and magnesia, O. LOEW (*Porto Rico Sta. Circ. 10, pp. 3–15*).—This is a critical review of the various investigations which have been made upon the influence of the ratio of lime to magnesia on the fertility of soils. It is shown to be of great importance to determine the magnesia as well as the lime content of soils in order that the proper ratio between these constituents may be obtained. This is of special importance in the case of Porto Rican soils on account of the great variation in the lime-magnesia ratio.

The use of manganese as a fertilizer, HAFFNER (*Bul. Écon. Indo-Chine, n. ser., 11 (1908), No. 74, pp. 514–519*).—This article contains a note presented to the French Academy of Sciences by G. Bertrand, showing the favorable action of manganese salts on oats as well as an account of experiments which showed the beneficial effect of manganese on rice.

The results of experiments on sugar beets with distillery vinasse (*Ann. Dir. Hydraul. et Amélior. Agr., Min. Agr. [France], 1907, No. 36, pp. 25–29*).—Very favorable results with sugar beets on a soil poor in potash are reported from the use of 500 to 1,500 cubic meters of the vinasse per hectare, supplying from 40 to 120 kg. of nitrogen, 50 to 150 kg. of phosphoric acid, and 250 to 750 kg. of potash per hectare.

Researches on the preservation of night soil, K. ASO and S. NISHIMURA (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 2, pp. 145–151, fig. 1*).—Superphosphate was shown by laboratory and field experiments to be an effective preservative for night soil due to fixation of ammonia and the checking of putrefaction of the nitrogenous matter by the monocalcium phosphate present. Gypsum and kainit were found to be less effective than superphosphate in fixing ammonia.

Manures and substances proposed as manures, R. D. WATT (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 265–268*).—Analyses are reported of samples of potash salts, native guanos, leaf mold, slack-heap ashes, lime, and limestones.

Fertilizers, R. E. ROSE and L. HEIMBURGER (*Fla. Quart. Bul. Agr. Dept., 19 (1909), No. 3, pp. 36–58, 70–83*). The laws and regulations controlling the inspection and sale of mixed fertilizers and cotton-seed meal in Florida are given

with notes on valuation and analyses of fertilizers inspected up to July 1, 1909. The inspection of cotton-seed meal is provided for by an act approved June 8, 1909, fixing the standard of cotton-seed meal sold in the State, prohibiting the sale of inferior cotton-seed meal without notice to the public, and prohibiting the misbranding of cotton-seed meal.

Analyses of fertilizers sold in Maryland, H. B. McDonnell et al. (*Md. Agr. Col. Quart., 1909, No. 45, pp. 64*).—This bulletin reports the results of fertilizer inspection during the first half of 1909.

Analyses of fertilizers, fall season, 1908, and spring season, 1909, B. W. Kilgore et al. (*Bul. N. C. Dept. Agr., 30 (1909), No. 7, pp. 85*).—The guaranteed composition of fertilizers registered for 1909, and analyses and valuations of about 655 samples of commercial fertilizers and 95 samples of cotton-seed meal, examined during the fall of 1908 and spring of 1909, are reported, with explanations regarding terms used in fertilizer analyses, freight rates, valuation, etc.

Standard fertilizers and the fertilizers act, 1909, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 182, pp. 31*).—This bulletin gives the results of analyses of 182 samples of fertilizers inspected under the fertilizer law of 1890 and the text of the fertilizer law enacted in 1909. The new law provides for registration of every brand of fertilizer under a number, which remains unchanged from year to year, a guaranty of nitrogen, phosphoric acid, and potash present, the sampling of fertilizers on the market by official inspectors, and for special analyses. A statement of the relative value of the fertilizers inspected is to be discontinued.

AGRICULTURAL BOTANY.

Ecology of plants, E. Warming et al. (*Oxford, 1909, pp. XI+422*).—This is an English edition of the authors' introduction to the study of plant communities, first printed in Danish in 1895. In the present volume considerable new matter has been introduced, including an entirely new system of classification in which 13 plant classes based on edaphic and climatic distinctions are recognized instead of the 4 in the earlier work. The changes in classification are largely due to Dr. M. Vahl. An extensive bibliography of the literature on the subject is given.

This book will doubtless prove a valuable addition to botanical literature, as it treats of matters of morphological, physiological, and systematic botany that have a practical application in agriculture, horticulture, and forestry.

The viability of weed seeds under different conditions of treatment, and a study of their dormant periods, H. S. Fawcett (*Proc. Iowa Acad. Sci., 15 (1908), pp. 25–45*).—Comparative studies were made of the viability of different species of weed seeds, especially those found in cultivated fields and pastures, and also of their dormant periods in order to determine if possible means of destroying these seeds. In all 92 samples of weed seeds, representing 52 species, were used, and the results of the investigations are shown in tabular form.

It appears that the general effect of exposing the seeds to thawing and freezing was to increase the percentage of germination and to shorten the dormant period. This was especially true of seeds having hard seed coats. Where the seed possessed thin, delicate seed coats in a few instances the vitality of the seed was lessened or destroyed. In general it was found that most weed seeds with thick seed coats require a more or less extended period of rest after maturity, and the vitality of nearly all weed seeds is weakened by drying out. The power of germination was increased by exposure to the conditions usually

prevailing in the fall and spring, which are the natural periods for the best seed germination.

Variation of fungi due to environment, F. L. STEVENS and J. G. HALL (*Bot. Gaz., 48 (1909), No. 1, pp. 1–30, figs. 37*).—Attention is called to the variation found in studies of fungi made during the past few years, and attempts were made to analyze the cause of the variations to the end that the factor of environmental variation may be more clearly recognized as a problem in mycology. The effect of density of colonies, density of mycelium, chemical relations, light relation, and several unknown factors are discussed at length, and the variability in spore measurements due to various factors is shown by means of diagrams.

The authors state that the bearing of these facts on mycological taxonomy is apparent, and that the tendency to variation should be recognized in making studies of many fungi. They believe that many fungi should be studied in cultures, under suitable standard conditions, in order to determine some of their more important taxonomic characters.

Notes on Peronosporales for 1907, G. W. WILSON (*Proc. Iowa Acad. Sci., 15 (1908), pp. 85–89*).—Studies were made of various genera and species of mildews to determine the interrelation of meteorological conditions and the development of these fungi, and also the location of centers for seasonal distribution. Sixteen species have been under observation, represented by 72 specimens, and of these only 8 contained oospores. The seasonal distribution showed that *Plasmopara pygmæa* is an early spring form, and *Bremia lactucæ*, *Peronospora euphorbiæ*, and *P. potentillæ* early summer forms, while *Albugo portulacæ*, *A. tragopogonis*, *Rhysotheca halstedii*, *Peronospora effusa*, and *P. polygoni* appeared during the latter part of the summer and in autumn.

Synopsis of the British Basidiomycetes, W. G. SMITH (*London, 1908, pp. 531, pls. 5, figs. 145*).—The publication is designed as a handbook for the study in the field of the larger British fungi, and a descriptive catalogue is given of the drawings and specimens in the department of botany of the British Museum. More than 2,000 species are described, including those growing in the open air and those constantly appearing in greenhouses and in gardens. The term Basidiomycetes is used in the same sense as it was employed by Debary, and includes all mushroom-like fungi, the forms growing on stumps and trees, puff balls, etc., but not the rust fungi which are included by Brefeld.

The effect of chemotropism on the parasitic action of fungi, L. PETRI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), I. No. 10, pp. 545–553, figs. 3*).—Experiments with a number of species of grasses are reported in which their susceptibility to the fungus *Sclerotinia libertiana* was investigated.

The author found that some species of grasses possess a natural immunity against this fungus while not showing immunity against the citase elaborated by the fungus. He is led to believe that immunity against parasitic organisms on the part of the plant is based on the minimum content of nutritive substances in the aerial organs that exercise a positive chemotropic stimulus upon the fungus sufficient to produce citase and of the presence of sufficient oxalate of potash to overcome the neutralizing action of the cellular content of the higher plant.

The author thinks that in the cases studied, and probably in many others, natural immunity against parasitic micro-organisms is secured through the occurrence in the various organs of a minimum stimulating action and a maximum neutralizing effect of the enzymic activity of the parasite. In those plants which are lacking in antienzymic power natural immunity is wanting.

Toxic and antagonistic effects of salts as related to ammonification by Bacillus subtilis, C. B. LIPMAN (*Bot. Gaz., 48 (1909), No. 2, pp. 105–125, figs. 5*).—The effect of the chlorids of calcium, magnesium, potassium, and sodium, as shown on the activity of *B. subtilis*, is reported upon.

Each of the 4 chlorids was found toxic in the order enumerated, calcium chlorid being the most toxic and sodium chlorid the least. This is said to be quite different from the results with higher plants where magnesium is the most toxic and calcium the least. There were found to be marked antagonisms existing between calcium and potassium, magnesium and sodium, and potassium and sodium. No antagonism was found to exist between magnesium and calcium, but the toxic effect of each is increased by the addition of the other.

These experiments are held to have practical application because of the fact that the salts experimented with are all found in soils in greater or lesser amounts, and in some soils they are present in excess.

On similarity in the behavior of sodium and potassium, W. J. V. OSTERHOUT (*Bot. Gaz., 48 (1909), No. 2, pp. 98–104, figs. 4*).—The author carried on two extensive series of experiments with the chlorids of sodium and potassium to determine the commonly accepted statement that potassium and sodium, while agreeing closely in chemical behavior, have fundamentally different effects upon plants. Most of the experiments were carried on with wheat, but other plants as algæ, liverworts, Equisetum, and various genera of flowering plants were also used.

The results obtained show that the accepted idea that sodium and potassium have entirely different effects upon plants is not valid in the field of toxic and protective action, but that their behavior shows the close similarity which would be expected when their near chemical relationship is considered.

Some notes on the modifications of color in plants, H. KRAEMER (*Science, n. ser., 29 (1909), No. 751, p. 828*).—In a paper presented before the American Philosophical Society, in which the author first reviews the previous work on the control of color in plants, an account is given of his experiments in using various chemicals which were either supplied to the plants in the form of solutions or added to the soil in solid form.

When the white rose Kaiserin was supplied with potassium hydrate, potassium carbonate, calcium hydrate, and lead acetate, red pigments were developed in the basal portion of the petals. This rose tends to a yellowish color but never shows pink or red, and therefore the red color produced in the petals was a new character. The explanation offered is that either the added chemical reacted directly with the compound already present in the petals or induced the formation of an entirely new substance in the petals, or that the color substance was formed in other parts of the plant and transported to the petals through the influence of the chemicals.

The red-flowering form of *Hydrangea otaksa* gave blue flowers when growing in either sand or garden soil and supplied with potassium and aluminum sulphate or aluminum sulphate and calcium hydrate. In those plants grown in sand and supplied with a nutrient solution and potassium carbonate blue flowers were also produced. The flowers remained pink or red when grown in either soil or sand and fed with a nutrient solution to which iron and ammonium sulphate or lead acetate was added. The original color of the plants was considerably intensified, due to the presence of lead acetate. In the case of plants grown in soils supplied with potassium carbonate there was no change in color.

The effect of salts upon pigments, E. A. BUNYARD (*Gard. Chron., 3. ser., 46 (1909), No. 1180, pp. 97, 98*).—After giving an account of the experiments of Kraemer, described above, the author calls attention to the effect of cold on the changing of color in plants. The rose Frau Karl Druschki had the outer petals

changed to a deep carmine after the cold nights of the early summer, and a red pigment was noticed in white geraniums which does not appear when the flowers are grown in greenhouses at high temperatures. Other examples are cited where low temperatures produce red pigments in otherwise white flowers.

The chemistry of chlorophyll and its relation to the chemistry of the coloring matter of the blood, L. MARCHLEWSKI (*Die Chemie der Chlorophylle und ihre Beziehung zur Chemie des Blutfarbstoffs. Brunswick, 1909, pp. X+187, pls. 7, figs. 6, dgm. 1*).—This work is practically a second edition of the author's monograph on the chemistry of chlorophyll, the original of which appeared in volume 8 of Roscoe, Schorlemmer, and Brühl's Handbook of Organic Chemistry. The subject-matter has been rewritten and brought to date.

After a discussion of the occurrence and functions of chlorophyll, methods are given for its isolation and the spectroscopic appearance of crude and pure chlorophyll is described. The author then takes up the subject of derivatives of chlorophyll, describing the effect of acids and alkalis on this coloring material. Chapters are devoted to the transformation of chlorophyll by animal organisms and to the chemistry of the coloring materials in the blood. The author discusses at some length the relationship between the coloring matter of leaves and that of blood. Some of the phases of this discussion have already been noted (E. S. R., 20, p. 1026).

The photodynamic work of chlorophyll and its relation to photosynthesis in plants, W. HAUSMANN (*Jahrb. Wiss. Bot. [Pringsheim], 46 (1909), No. 4, pp. 599–623*).—This is a detailed account of investigations previously noted (E. S. R., 21, p. 227).

The production of anthocyanin as a result of annular decortication, R. COMBES (*Bul. Soc. Bot. France, 56 (1909), No. 3–4, pp. 227–231*).—While studying the formation of anthocyanin in plants in which the author was observing the reddening of *Spiræa prunifolia* and *S. paniculata*, he observed that when accidentally decorticated the leaves beyond the point where the stem had been ringed turned red, while below they remained a normal color. It was shown that annular decortication of stems resulted in checking the translocation of nutritive substances, notably those formed in the leaves by photosynthesis. This results in an accumulation of carbohydrates toward the tops of the branches and brings about the production of anthocyanin in the leaves of that part of the stem.

The development of fat in the black walnut (Juglans nigra), F. M. M'CLENAHAN (*Jour. Amer. Chem. Soc., 31 (1909), No. 9, pp. 1093–1098*).—From the author's experimental studies and analyses of black walnut kernels at different stages of growth a number of general conclusions were drawn.

"Starch, sugar, and tannin were absent from the kernel at all periods of its development.

"Fuchsin was not able to penetrate into the interior of the kernel capsule, although it would penetrate the other parts of the nut.

"Tannin was markedly present in the hull and the tissue of the kernel capsule.

"When the kernel was entirely a liquid (June 15th) there was a pronounced fluid pressure.

"The first formation of the jelly-like kernel was on the interior surface of the capsule tissue. This gradually changed to a white solid, while the jelly-like formation retreated toward the center of the chamber of the capsule, replacing in turn the liquid and finally being itself replaced by the solid kernel.

"The fats increase out of all proportion to the increase or decrease of other constituents. . . .

"Evidently the fat in the walnut is not formed from starch, sugar or tannin within the capsule of the kernel. The quantitative relation of the fats to the crude fiber, proteins, and pentosans would not lead one to believe that the fats were formed from the decomposition products of these substances. . . . The early disappearance of acidity would indicate that at an early date in the nut's development the migration of free fatty acids into the capsule had ceased, if any such phenomenon had ever taken place. . . . After the kernel had become solid the increase of fat went on, although there was no substantial change within the kernel in reference to the other components and there was no marked development of fat elsewhere in the nut than in the kernel. The most noticeable development aside from the fat was the tannin in the hull."

The analyses reported contain data regarding ash constituents as well as organic constituents.

The distribution of poisons in the Amanitas, W. W. FORD (*Jour. Pharmacol. and Expt. Ther., 1 (1909), No. 2, pp. 275–287*).—The author claims to have developed a method for the isolation and purification of poisons in Amanitas, particularly of hemolysin, and he gives the results of studies with a number of species in which the presence or absence of the poisonous substances amanita hemolysin, amanita toxin, and muscarine was determined. As a result of his experiments, which were carried on with rabbits and guinea pigs, he found *Amanita phalloides*, *A. virosa*, *A. spreta*, *A. porphyria*, *A. strobiliformis*, *A. radicata*, *A. chlorinosma*, and *A. muscaria* definitely poisonous and to be avoided, while *A. rubescens* and *A. russuloides* are considered as probably free from toxic properties.

Studies made of *A. frostiana*, a species that is closely associated with *A. muscaria*, showed that an aqueous extract was hemolytic in moderate degree, but that all the plants were free from resistant toxin and muscarine. It is thought that this species can not be as closely related to *A. muscaria* as its botanical characteristics would suggest. On account of its close resemblance to the fly agaric the author states it should be scrupulously avoided.

"Nearly 20 species of Amanitas have now been examined by the methods which have been worked out for the demonstration of the 3 most important poisons in fungi, muscarine, hemolysins, and toxins. By the use of these methods, a small amount of material, even 1 or 2 plants, can be analyzed and the properties of the species established."

Studies of vegetable rennets. Rennets of Solanaceæ, C. GERBER (*Compt. Rend. Soc. Biol. [Paris], 67 (1909), No. 27, pp. 318–324*).—The results of studies on vegetable rennets isolated from various species of solanaceous plants are given. Two types of rennet are recognized, one isolated from the tree tomato (*Cyphomandra betacea*) and the other from belladonna (*Atropa belladona*). The effect of heat, chemical bases, and neutral salts of alkaline metals, as well as the localization of rennets in various parts of the plants, are discussed.

Notes on the histological structure and specific gravity of the seeds of Pyrus, L. H. PAMMEL and LUELLA ROBB (*Proc. Iowa Acad. Sci., 15 (1908), pp. 47–55, pls. 2*).—Histological studies were made of the seeds of various varieties of apples, and their specific gravity was determined. Marked variation is shown in the structure of the seeds of a number of the varieties, and the specific gravity was also found to vary with different varieties.

FIELD CROPS.

Report on irrigation and dry farming and cereal investigations at the Auxiliary Station at Caldwell, E. NELSON (*Idaho Sta. Rpt. 1908, pp. 16–29*). Wheat, irrigated 3 times from May 19 to June 29, and receiving a total of 15.56

in. of water, yielded at the rate of 18.2 bu. per acre. Second year alfalfa, receiving 7 irrigations from April 30 to September 9 gave a total yield of 5.16 tons per acre. The total amount of water applied amounted to 22.15 in. Another alfalfa plat irrigated in the same way, except that one of the irrigations was given in October, yielded 1.54 tons more. Wheat with winter irrigation and with a total of 8.21 in. of water used or evaporated, yielded at the rate of 16.07 bu. per acre. As a rule, winter and summer irrigation gave better yields than either winter irrigation or summer irrigation alone.

Tables are given showing the chemical composition of wheat as affected by different amounts of water applied in irrigation and the protein content as affected by cultural methods. The analyses showed that wheat grown in rows and cultivated contained a greater percentage of protein, though the amount of water applied was the same. It was further observed that the plats producing wheat with the greatest percentage of protein also ranked high in yield.

Cassia County Flint corn yielded 29 bu. per acre in 1907 and 46.8 bu. in 1908. Two varieties of Dent corn did not give such good yields. Notes are also given on a culture test with sorghums.

Report of the work at the Holly Springs Station for 1908, C. T. Ames (*Mississippi Sta. Bul. 122, pp. 10*).—The results of fertilizer work with cotton showed that untreated finely ground phosphate rock either alone or with cotton-seed meal was satisfactory on thin soils, giving about the same results as an equal weight of acid phosphate. Cotton-seed meal alone also seemed to produce good yields. For the brown loam area 200 lbs. of an equal mixture of high-grade cotton-seed meal and either ground phosphate rock or acid phosphate per acre is recommended for ordinary uplands. For the better classes of soils it is suggested that a mixture consisting of one-third cotton-seed meal and two-thirds acid phosphate applied at the rate of from 300 to 400 lbs. per acre will give good results.

Of 16 varieties of cotton tested in 1908, Cleveland Big Boll, Excelsior, Moss Improved, Bledso Mortgage Lifter, Triumph, Lewis Prize, and New Imperial ranked first, the total value of seed and lint cotton per acre of these varieties being $36.52, $35.78, $34.36, $30.58, $30.47, $30.15, and $30.00 respectively.

Finely ground phosphate rock as a fertilizer for corn gave better results than any of the other applications tried. Cotton-seed meal, in most instances, gave satisfactory yields and acid phosphate was also profitable. For the brown loam area from 200 to 400 lbs. of finely ground phosphate rock is recommended for growing corn on the better class of soils. For thin soils an equal mixture of high-grade cotton-seed meal and either finely ground phosphate rock or acid phosphate applied at the rate of 100 to 300 lbs. per acre is recommended.

Ten varieties of corn were tested on ordinary valley land which had received per acre 5 tons of barnyard manure the fall before and 250 lbs. of an equal mixture of cotton-seed meal and acid phosphate in the drill before planting. The yields ranged from 70.55 bu. per acre for Cocke Prolific to 43.61 bu. per acre for Hickory King. Boone County White, standing next to Hickory King, yielded 51.37 bu. per acre.

Report of the director of agriculture, G. E. Nesom (*Rpt. Philippine Com., 1908, pt. 2, pp. 273–311*).—In this general review of the agricultural situation in the Philippine Islands, the author discusses, among other topics, agricultural extension, agricultural engineering, experiments with different crops, seed and plant introduction and distribution, and the work pursued at the different experiment stations and farms.

Report of the agricultural department, Bengal, for the year ending June 30, 1908, W. R. Gourlay (*Rpt. Agr. Dept. Bengal, 1908, pp. II+12+XV*).—This publication treats of the organization of the department, the experiments

under its control on public and private estates, and agricultural associations and agricultural shows. Brief notes on the different crops grown are given.

Report of the agricultural department, Eastern Bengal and Assam, for the year 1907–8, S. G. HART (*Rpt. Agr. Dept. East. Bengal and Assam, 1907–8, pp. 19+VII*).—This publication is a general report of the different lines of work under the supervision of the agricultural department, including notes on the progress in introducing agricultural improvements in regard to cotton, jute, potatoes, sugar cane, rice, wheat, and other crops.

Annual report of the agricultural stations in Eastern Bengal and Assam for the year ending June 30, 1908, S. G. HART (*Ann. Rpt. Agr. Stas. East. Bengal and Assam, 1908, pp. 170*).—This publication contains the annual report of the Dacca, Rangpur, Burirhat, Rajshahi, Jorhat, Shillong, Upper Shillong, and Wahjain experiment stations. Each of the stations is described and the culture tests with numerous tropical crops are briefly noted.

Agriculture in the Tropics, J. C. WILLIS (*Cambridge, 1909, pp. XVIII+222, pls. 25*).—The four parts of this book are devoted respectively to the preliminaries of agriculture, the principal cultivations of the tropics, tropical agriculture in general, and agricultural organization and policy.

The cultivated plants of our colonies, D. WESTERMANN (*Die Nutzpflanzen unserer Kolonien. Berlin, 1909, pp. 94, pls. 36*).—This book describes briefly numerous crops grown in the German colonies, including grains, root crops, tropical fruits, spices, oil-producing plants, fiber plants, and rubber, tannin, and medicinal plants. A brief note is also given on the principal forest trees occurring in the various colonies.

The culture of industrial plants in Argentina, C. D. GIROLA (*In Censo Agropecuario Nacional la Ganaderia y la Agricultura en 1908. Buenos Aires: Govt., 1909, vol. 3, pp. 397–448*).—This article treats of the textile, oil, root, sugar, spice, narcotic, aromatic, resin, and medicinal crops grown in Argentina.

A contribution to the question of the choice of varieties of grains for the province of Silesia, J. STANJEK (*Ein Beitrag zur Frage der Sortenauswahl bei Getreide für die Provinz Schlesien. Inaug. Diss., Univ. Breslau, 1906, pp. 134*).—The climatic, soil, and other cultural conditions of Silesia are considered and data regarding the yields secured from varieties of rye, barley, wheat, and oats are presented. The climatic and soil conditions existing at 16 different seed-growing establishments are described and the publication concludes with a list of 144 references having a bearing on the subjects discussed.

The following varieties are reported as giving the best yields: Rye—Petkus and Prof. Heinrich; barley—Goldthorpe, Hanna, Imperial, Webb, Swedish Princess, and Frederikson; winter wheat—Mette, Besel, Strube, Rimpau, Steiger II, Heine, and Danish and Swedish square-head wheats; and oats—Ligowo, Anderbeck, Besel, Strube-Schlanstedt, Hvitling, Sechsamt, Pfiffelbach, and Leutewitz yellow.

The Berlin and Vienna systems of judging barley, A. CLUSS and J. SCHMIDT (*Separate from Allg. Ztschr. Bierbrau. u. Malzfabrik., 37 (1909), No. 8–12, pp. 20*).—The systems of judging barley in vogue in different localities and practiced by numerous investigators are discussed in detail. The authors regard the relations between the following factors as highly important in judging barley: Starch and extract content, protein content and starch and extract content, the weight per 1,000 kernels and protein content, the weight per 1,000 kernels and the starch and extract content, and the thousand-kernel weight and the percentage of hull.

Report on agriculture in Asia Minor, with special reference to cotton cultivation, W. DUNSTAN (*London: Govt., 1908, pp. 18, maps 2*).—The examina

tion of a number of samples of cotton grown in Asia Minor showed that fiber of excellent quality can be produced in that country. Some of the samples of native varieties were stained but the American varieties were generally free from stains. The samples from American varieties were generally very promising and in some cases approached very nearly in quality similar varieties grown in the United States. A cotton, known as No. 5 Tarsus, of the Egyptian Abassi type, appeared very promising.

A profitable cotton farm, C. L. GOODRICH (*U. S. Dept. Agr., Farmers' Bul. 364, pp. 23, figs. 12*).—This bulletin contains a description of a cotton farm in the east-central part of South Carolina, together with an outline of its management, including methods of growing cotton, corn, oats, cowpeas, the keeping of live stock, and the equipment.

Apparently as due to the present management, the results of the first year showed a yield of 1½ bales of cotton per acre and 37 bu. of corn per acre as compared with previous yields of 300 lbs. of seed cotton and 5 to 8 bu. of corn per acre. The yields continued to increase, although the amount of commercial fertilizer used was decreased, the cotton yield rising to 2.27 bales per acre in 1908 and the corn yield to 85 bu. per acre in 1907. Likewise the oat yield increased from 10 bu. per acre with 150 lbs. commercial fertilizer in 1902 to 80 bu. in 1908 without any commercial fertilizer. The important features of the management are clearing the field, filling the gullies, deep plowing in the broad, gently sloping lands, instead of terracing, the practice of a systematic rotation of crops including cotton, corn, oats, and cowpeas, the feeding of live stock, and the application of barnyard manure to the cotton land.

Cotton cultivation: Its extension in Ceylon, J. S. J. MCCALL (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1909), No. 19, pp. 165–178, pl. 1*).—The condition and prospects of the cotton industry in Ceylon in the past and at present are briefly reviewed.

Flax culture and flax industry in Holland, Belgium, and France, J. FROST (*Ber. Landw. Reichsamte Innern [Germany], No. 9, pp. 142, pls. 20, figs. 25*).—This publication discusses the different phases of flax culture and describes the condition of the industry in each one of the countries mentioned.

A study of the varieties of Abaca (Manila hemp), M. M. SALEEBY (*Philippines Agr. Rev. [English Ed.], 2 (1909), No. 3, pp. 165–170, pl. 1*).—This article enumerates the 9 varieties of Abaca under cultivation in the district of Davao, and gives descriptions of each variety, including notes on the quality and quantity of the fiber produced.

The varieties considered most valuable are Tangouan, Maguindanao, Libuton, and Bangulanun. The Arupan and Lumawaan varieties are considered medium in value, while Puteean, Baguisanun, and Agutay, on account of weakness in the fiber produced and other undesirable characteristics, are not recommended for planting.

Observations on the relation between specific gravity and the germinative energy of oats, R. STIGELL (*Fühling's Landw. Ztg., 58 (1909), No. 9, pp. 342–344*).—The results of different investigators working along this line are briefly reviewed and the data secured by the author are presented. It is pointed out that, with only one exception, the time required for the grain to germinate decreased regularly as its specific gravity increased. The results are regarded as indicating that the specific gravity of the seed and the factor called germinative energy, or the time required for the seed to germinate, are directly correlated.

Farm management in northern potato-growing sections, L. G. DODGE (*U. S. Dept. Agr., Farmers' Bul. 365, pp. 31, figs. 11*).—Statistics of potato growing in the United States, cultural methods employed in Aroostook County, Maine, and

in other sections, the cost of producing the crop, and seed selection are discussed, and recommendations with reference to soils best adapted to potato growing, the importance of crop rotation, the use of commercial fertilizers, the application of barnyard manure, the necessity of thorough cultivation, spraying for the prevention of blight, potato machinery, marketing the crop, and maintaining a supply of humus in the soil, are given.

Observations on the sugar content of sugar-beet crops, B. SCHULZE and LIPSCHITZ (*Fühling's Landw. Ztg., 58 (1909), No. 10, pp. 345–355*).—The observations here reported indicate that the meteorological conditions of September and October do not alone control the quality of the beet but that the temperature, sunshine, and precipitation in July are of greater consequence in this regard. The data secured indicate plainly that the temperature in July stands in direct relation to the ripening process of the beet and that the temperature of the later months is not so prominent in this respect.

The beet sugar industry (*Census and Statis. [Canada] Bul. 9, pp. 75, figs. 3*).—This bulletin is a report on an investigation of sugar-beet production in Canada and the manufacture of beet sugar. The history of the industry is reviewed, its present condition discussed, and sugar statistics for Canada and other countries reported.

Annual report of the bureau of sugar experiment stations for the year 1908–9, W. MAXWELL (*Ann. Rpt. Bur. Sugar Expt. Stas. [Queensland], 1909, pp. 60*).—Among the experimental results discussed in this report are the average yields from second rattoons of the 10 best varieties grown under four different conditions—irrigation or nonirrigation and manuring or nonmanuring. In 1908, the irrigated plats with manures gave 14 cwt. more cane per acre than the unirrigated plats receiving manures, while the irrigated plats without manures gave a slightly lower result than the unirrigated plats without manures, the difference being 2 cwt. of cane per acre. The increase apparently due to manures was for the irrigated plats 15.5 tons of cane and 2.4 tons of sugar per acre, and for the unirrigated plats 14.7 tons of cane and 2.1 tons of sugar per acre. The leading varieties of cane in this experiment were New Guinea 24, 24A, and 24B, together with New Guinea 15 or Badila.

The results of a subsoiling experiment showed that the total first and second rattoon crops on the subsoiled and cultivated plats exceeded by 24 tons of cane per acre the corresponding yield on the nonsubsoiled and uncultivated plats. The results of distance experiments indicated that plants with 3 eyes placed 6 in. apart in the row or closer is the best way of planting in the row. A distance exceeding 5 ft. between the rows was found likely to result in a lower yield of cane and sugar per acre than where the planting is closer.

A new series of experiments with seedlings and varieties is outlined and work along various lines and with crops other than sugar cane in the different districts is described.

Cane seedlings in Java, J. D. KOBUS (*Internat. Sugar Jour., 11 (1909), No. 128, pp. 373–379*).—This paper, presented at the International Congress of Applied Chemistry, London, 1909, reviews the work of growing young sugarcane plants from seed and summarizes the results along this line secured in Java. It is stated that in eastern Java only seedling canes are now cultivated, while in the western provinces where conditions are more favorable the old Cheribon cane is still used to some extent. The increase in the Java sugar production from 2.5 tons per acre in 1887 to over 4.5 tons in 1908 is considered chiefly due to the cultivation of seedling canes.

Sweet potato culture, F. GARCÍA (*New Mexico Sta. Bul. 70, pp. 5–35, figs. 8*). Sweet potato plants, irrigated immediately after setting out and receiving from 5 to 8 additional irrigations, have matured good crops at the station.

Placing the plants from 15 to 18 in. apart in rows 3½ to 4 ft. apart gave satisfactory yields. The Bermuda type was the most productive, the average yield for 3 years being 18,371 lbs. per acre. The average cost of production, not including the hauling, the growing of the slips, and the cost of sacks, was $61.75, and the estimated total cost $128.44.

Trimming the sweet potato vines apparently had no advantage. A heavy vine growth seemed to be correlated with a large yield of tubers. In two experiments the use of 400 lbs. per acre of nitrate of soda seemed to increase the yield. It is the experience of the station that a better stand in the field can be secured from home-grown plants than from those shipped from a long distance. The estimated net receipts per acre at the station for the 3 years 1907–1909 were $123.81. Storing sweet potatoes in dry sand reduced decay and evaporation.

Preparing land for winter wheat, A. M. Ten Eyck and L. E. Call (*Kansas Sta. Circ. 2, pp. 4*).—The results with several methods of preparing the seed beds for winter wheat carried on for the past two seasons are briefly reported.

Plowing was done on July 15, August 15, and September 15. The highest yields were obtained from the August 15 plowing. The wheat on the early plowed plat, which was an old alfalfa field, lodged, and this may have interfered with the yield. One plat plowed August 15 and cultivated after plowing received two harrowings before September 15, while a second plat plowed at the same time was not surface cultivated until September 15. The two harrowings increased the yield in 1907 by 4 bu. per acre and in 1908 by 2 bu. per acre. The late plowing each year gave the lowest yield of any of the plowed plats. Listing and disking did not prove especially successful.

It is recommended that the seed bed for winter wheat should be mellow and well pulverized only about as deep as the seed is planted and that below that depth the soil should be firm and well settled. This condition, it is pointed out, will supply moisture to the seed from the firm soil below and the mellow soil above will prevent a too rapid evaporation.

Variety tests of wheat, C. F. Noll (*Pennsylvania Sta. Bul. 94, pp. 3–13*).—The results of variety tests in 1908 and 1909 are reported in tabular form with brief comments.

The highest yielding varieties according to the averages for the last 4 years ranked as follows: Dawson Golden Chaff, Harvest King, Fulcaster, Turkish Amber, Beechwood Hybrid, Rochester Red, Forty Fold or Gold Coin, China, and Reliable. The grain yields of these varieties ranged from 36.4 to 32.6 bu. per acre. Turkish Amber led in straw production with an average yield for the 4 years of 4,191 lbs. per acre, followed by Fulcaster with 4,129 lbs. Dawson Golden Chaff stood last among these varieties as a straw producer, the average yield for the variety being only 3,153 lbs. per acre. Dawson Golden Chaff, Harvest King, and Rochester Red, which exhibit considerable resistance to lodging on account of their stiff straw, are recommended for rich land. Preliminary milling and baking tests have indicated that Dawson Golden Chaff is inferior in quality to Fulcaster.

A comparison of different dates of sowing was conducted in 1907 and 1908. The wheat was sown on 8 different dates from August 18 to October 27. In 1907 the wheat sown October 8 gave the highest yield of grain and that sown September 8 the highest yield of straw, while in 1908 the wheat sown August 28 ranked first in yield of both grain and straw. The yields from these different seedings were largely controlled by the prevalence of the Hessian fly. The first year the late seeding yielded comparatively well because the early seeding was injured by this insect. In addition good growing weather in October and November favored the late sown wheat. In the second year a small injury by the

fly and the warm weather and timely rains in September favored the early seeding, while cool weather in October and November checked the growth of the later seeding.

Wheat culture tests of the Silesian wheat growers' association, 1906–1908, OPITZ (*Ztschr. Landw. Kammer Schlesien, 13 (1909), No. 35, pp. 1040–1048*).—The results of this cooperative experiment indicated the superiority of Leutewitz squarehead and Strube Schlanstedt squarehead wheats, the average yields of these varieties being 2,987 and 2,845.5 kg. per hectare (2,658 and 2,531 lbs. per acre), respectively. These sorts also produced the stiffest straw. The results for all varieties of each individual test are given in tables.

Grain yields of the world in 1907 (*Die Getreideernte der Welt im Jahre 1907. Budapest: Govt., 1908, 2. ed., pp. 45*).—The production of different grains in all the principal grain-producing countries of the world is briefly noted.

Production of the principal grains in 1908 (*Ernteergebnis der Wichtigsten Körnerfrüchte im Jahre 1908. Vienna, 1908, pp. 12, dgms. 5*).—Statistics on the production of wheat, rye, barley, oats, and maize in the Austrian Empire are presented.

Weeds; their eradication and control, G. E. ADAMS (*Rhode Island Sta. Bul. 133, pp. 51–61, pls. 2*).—A classification of weeds is given in this bulletin, general methods of control are pointed out, and the results of experiments with iron sulphate in eradicating certain weeds are briefly reported.

It was found that solutions of this substance can be used to control the daisy in hay fields, mustard in cereal fields, and dandelions on lawns. Charlock (*Raphanus raphanistrum*) proved resistant to the iron sulphate spray. The most satisfactory results were obtained from the use of a 20 per cent solution, applying about 100 to 150 lbs. of iron sulphate per acre. It is stated that success depends upon the application of the solution in a fine spray and in a forcible manner at the proper stage of growth.

The eradication of bindweed, or wild morning-glory, H. R. COX (*U. S. Dept. Agr., Farmers' Bul. 368, pp. 19, figs. 6*).—This bulletin contains a description of the different plants known as bindweed and presents methods of their eradication.

The most troublesome species are hedge bindweed (*Convolvulus sepium*) and field bindweed (*C. arvensis*), while *C. sepium repens* and *C. californicus* are of secondary importance. It is pointed out that hedge bindweed is propagated by rootstocks and field bindweed by roots, and that the top growth of the plants must be kept down to starve out the roots and rootstocks as one of the principal steps in their eradication. Clean cultivation, especially with implements that will keep down the top growth is advised. It is also stated that the bindweed may be greatly reduced or entirely destroyed by seeding the land to alfalfa and then following this plant with a cultivated crop. The use of chemicals as a method of eradicating bindweed has not been found very successful.

The cultivation of Passiflora fœtida and Mikania scandens to keep down other weeds, M. K. BAMBER (*Circs. and Agr. Jour. Roy. Bot. Gard. Ceylon, 4 (1909), No. 16, pp. 141–145, pl. 1*).—The value of these two plants in subduing other undesirable tropical growth is pointed out and mechanical and chemical analyses of the two species are reported.

P. fœtida loses on an average about 70 per cent of moisture on sun drying, and produces about 7,800 lbs. of air-dried material per acre, which contains as shown by the analyses 169 lbs. of nitrogen and 500 lbs. of ash, the latter including 155.6 lbs. of lime, 85 lbs. of potash, and 20.3 lbs. of phosphoric acid. *M. scandens* lost over 85 per cent of moisture on air drying. This species differs largely from the foregoing in containing only about one-fourth as much lime and two and one-half times as much potash.

Seed tests and microscopic examinations, A. VOIGT (*Jahrb. Hamburg. Wiss. Anst., 25 (1907), pp. 338–361*).—During the year ended June 30, 1908, 5,633 tests were made for 405 persons. The seed samples sent in were mainly clover, grasses and grains, and root and oil crops. The results of the examinations and tests are tabulated and a brief note on each kind of seed is given.

HORTICULTURE.

Pollination of the apple, C. I. LEWIS and C. C. VINCENT (*Oregon Sta. Bul. 104, pp. 3–40, figs 14*).—Owing to many complaints from various parts of the State relative to the lack of setting of fruit, the Oregon Station has taken up a number of pollination problems, the results of some of which are reported in this bulletin.

An account is given of the technique of pollination as employed by the authors. In the method herein outlined from 600 to 1,000 emasculations per day were made. The small camel's hair brush was found to be a practical and efficient way of applying the pollen to the stigmas, and very satisfactory results were obtained by applying the pollen at the time of emasculation, although many breeders do not make the applications until 2 or 3 days after the blossoms are opened. It is pointed out that when pollenizing and emasculating are done at the same time, the bags will not have to be removed again.

Experiments were made to determine the efficiency of wind in distributing pollen. In confirmation of Waugh's work (E. S. R., 11, p. 347), the authors found that plum pollen was not transmitted through the air in sufficient quantities to insure cross-pollination. Similar results were secured with apples.

Determinations were made of the sterility and fertility of 87 varieties of apples, out of which 59 varieties are classified as self-sterile, 15 varieties as self-fertile, and 13 varieties as partially self-fertile. This work appears to confirm the experience of Waite who found in similar work with apples that in the majority of cases no fruit resulted from self-pollination (E. S. R., 6, p. 47). Varieties that are naturally self-fertile are abundantly able to fertilize their pistils without artificial aid. Better results are obtained, however, when self-fertile varieties are crossed with other varieties.

Work was conducted to determine the best pollenizers for the Spitzenburg, which is only partially self-fertile, and for commercial purposes should be cross-pollinated. Sixteen varieties of apples were found to cross successfully with this variety, of which the Yellow Newtown, Ortley, Arkansas Black, Jonathan, Baldwin, and Red Cheek Pippin (Monmouth Pippin) are very promising. In some cases immediate effects of foreign pollen on the color of the fruit seemed perceptible. Spitzenburg crosses made by Jonathan pollen resembled the Jonathan in color, and with Arkansas Black pollen, the crosses took on a darker color. The above phase is to be further studied before conclusions are drawn. As compared with the crossed apples, the self-pollinated Spitzenburgs were inferior in size, ill shapen, and practically devoid of plump seeds. These differences are indicated by a diagram and table. With an increase in the weight of the crossed apple, there was a proportional increase in the weight of the seeds.

Crosses were made with the Yellow Newtown, a self-fertile variety, to determine the possibilities of improving such a variety by cross pollination with other varieties. As compared with the self-fertile fruits, the crosses invariably made much larger and finer apples, although no perceptible difference was detected between the quality, flavor and color of the self-fertile and the cross-pollinated fruits. Of the 18 varieties crossed with Yellow Newtown, a few such as Spitzenburg, Jonathan, and Grimes Golden gave excellent results. The authors point

out the need of a study of the mutual affinities of apples that are likely to be planted together, and for the purpose of throwing some light on this question, a list is given of a large number of successful crosses made during two years' work.

In cooperation with the Bureau of Plant Industry of this Department a record was kept for the past 2 years of the blooming periods of the fruits grown in the college orchard, and tables are given showing the blooming periods of 95 varieties of apples, 31 varieties of pears, and 17 varieties of cherries. For the locality in which the observations were made, it was found that apples remained in blossom 13 days, pears 11 days, and cherries 10 days. The varieties are grouped as early and late bloomers. A study of the table shows a variation of several days in the appearance of the first blossom of the several varieties. The possibility of selecting varieties with reference to their time of blooming, thereby partially eliminating the failure to set fruit, is pointed out.

Pollen was found to be capable of maintaining its viability for 3 weeks provided it was not allowed to ferment. As a solution to the problem of collecting an adequate supply of pollen for pollination experiments, the forcing house was resorted to where pollen can be ripened quite rapidly.

The culture of the pear, G. T. Powell (*Mass. Crop Rpt., 22 (1909), No. 5, pp. 28–36*).—This is a popular bulletin on pear culture discussing soils, preparation of the land, planting operations, varieties, plant distances, cultivation, pruning, diseases and insects and their control, and marketing.

Protecting fruits from late frost, Lancaster and Skeggs (*West. Fruit Grower, 20 (1909), No. 10, pp. 5, 6, fig. 1*).—A brief account is given of the experience of Grand Junction fruit growers in protecting their orchards from untimely frost by the use of smudges of various kinds. The results secured in 1908 indicate that the use of smudges is both efficient and practical.

On the grafting of American grapes, von Jablanczy (*Österr. Gart. Ztg., 4 (1909), No. 10, pp. 359–364, figs. 3*).—An account is given of the mechanism and use of a recently invented machine for grafting grapes, which is being employed to a certain extent in European practice. The style of graft made by this machine is known as the tap graft, being a modification of an older form known as the peg graft. The machine cuts a hole in the end of the stock, and a corresponding plug or tap on the end of the scion.

Report of the technical division of the grape-improving station, Geisenheim-Eibingen, Fischer (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1908, pp. 184–192*).—Data are given on the condition and character of both grafted and hybrid grapes under test at the station.

Culture of small fruits, C. I. Lewis and C. A. Cole (*Oregon Sta. Bul. 105, pp. 3–29, figs. 13*).—A popular bulletin containing suggestions for growing, harvesting, and marketing strawberries, raspberries, blackberries, Logan and phenomenal berries, gooseberries, currants, and cranberries.

The coffee plantations of Tonkin, P. J. S. Cramer (*Bul. Écon. Indo-Chine, n. ser., 12 (1909), No. 78, pp. 171–177*).—In the course of a visit to the coffee plantations of Tonkin a study was made of the virescence of the flowers of *Coffea arabica*. This trouble manifests itself in two forms. In one the flower is greatly reduced in size, and the petals are entirely green. In the other form the flowers are nearly white, the petals are twisted, and the pistils and anthers are aborted.

The conclusion is reached that the virescence of the flowers is a physiological phenomenon caused by whatever affects the nutrition of the plant, whether climatological, pathological, or agrological. The author suggests that conditions other than climate can be ameliorated by removing all excrescences which develop on the trees and by adopting a method of pruning which pro-

vides for constant renewal of the top of the tree. The conditions of climate and soil may be ameliorated somewhat by the use of companion and shade crops.

Date palm culture and commerce in Nefzaoua, JEANGÉRARD (*Bul. Dir. Agr. Com. et Colon.* [*Tunis*], *13* (*1909*), *No. 51, pp. 206–229*).—A brief account is given of the methods of planting and caring for date palms, and harvesting and marketing the fruit, together with notes on the more important varieties growing in Nefzaoua, including their nomenclature, age of bearing, character, yield, and market valuation of the fruit.

Report of the inspector of coconut plantations for the year 1908, L. C. BROWN (*Agr. Bul. Straits and Fed. Malay States, 8* (*1909*), *No. 9, pp. 426–434*).—A brief report on the condition of coconut plantations in the 4 Federated Malay States. The area under coconuts for the year 1908 approximated 118,697 acres as compared with 112,500 acres in 1907.

Report on the activities in pomology and gardening, E. JUNGE (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1908, pp. 40–65, figs. 4*).—This is a report on horticultural operations for the year, including notes on the condition of the station orchards, data on variety tests, lists of orchard varieties included in new plantings, and an outline of outdoor and indoor work with vegetables.

Some experiments in the application of carbolineum to fruit trees during the summer period are also reported. Judging from the one season's work, summer spraying with carbolineum does not seem to be highly successful in combating insect pests and plant diseases.

FORESTRY.

Measurements of the effects of forest cover upon the conservation of snow waters, W. R. MATTOON (*Forestry Quart., 7* (*1909*), *No. 3, pp. 245–248*).—The author reports observations made on the progress of snowfall and subsequent melting in a virgin stand of western yellow pine in northern Arizona, and on an adjacent treeless park covering an area of several square miles. The observations, which were made during the period from February 26 to April 25, included the measurements of each successive snowfall and the total depth of snow at intervals of 7 days. The progress of accumulation and subsequent melting of the snow in the two locations is summarized as follows:

"The total snowfall in the forest is somewhat more than over the open parks, due chiefly to accelerated wind velocity over the parks, resulting in a lighter deposition of snow, a case similar to the deposition of silt in stream courses.

"Due to protection afforded by the forest cover against extremes of cold resulting in a higher average temperature, the process of melting during the spring commences considerably earlier in the forest than in the adjacent open park.

"The low minimum daily temperatures in the park account for the formation of a thick layer of ice at the base of the snow during the early spring. This in turn serves to retain the moisture above the soil.

"During the month of March the park remained almost entirely covered with a deep and quite uniform layer of snow and ice, while in the forest the snow cover was much broken along rock ledges and banked high in the natural tree avenues, and the total amount of snow and water content above the soil surface was decidedly less per unit of area in the forest than in the park. The condition strongly suggested an apparent advantage of a treeless over a forested area in conserving the winter snowfall and storing a supply of moisture for distribution in the late spring when most needed.

"With rising spring temperatures and absence in the park of protection against extremes of heat, a point is reached—the usual 'warm spell'—when the layer of snow and ice in the park 'breaks up' very rapidly and the water goes off with a rush, resulting in a very small underground storage, and the further consequence of a rapid drying or baking of the soil.

"In the forest, due to the high efficiency of the tree canopy in modifying surface temperatures, and of the forest cover in checking the velocity of the winds which at this season of the year are strong and from the southwest, and blow with the regularity of the 'trades,' the progress of melting proceeds more uniformly and is prolonged into late spring or early summer with a minimum loss of water by surface run-off and evaporation and a relatively high storage in the forest soil."

The effect of frost upon the green and blue forms of Douglas fir, E. ZEDERBAUER (*Centbl. Gesam. Forstw., 35 (1909), No. 8–9, pp. 387, 388*).—Observations which were made in different forests in Austria relative to the comparative resistance to frost of young trees of the green and blue forms of Douglas fir (*Pseudotsuga taxifolia*), show on the whole that the blue form (*P. taxifolia glauca*) was much more resistant than the green form, particularly in open situations.

A study of piñon pine, F. J. PHILLIPS (*Bot. Gaz., 48 (1909), No. 3, pp. 216–223*).—A brief discussion of the piñon pine (*Pinus edulis*) relative to its general distribution, local occurrence, tolerance and form, wood, fruit, reproduction, and future management.

Eucalypts cultivated in the United States, C. WESTERGAARD, Jr. (*Forestry Quart., 7 (1909), No. 3, pp. 280–303*).—Descriptions are given of the species of eucalypts most generally cultivated in the southwestern United States, relative to their identification, growth, wood and its uses, climatic requirements, and occurrence.

Four years' experience growing rubber trees on Basilan, C. F. MILLER (*Philippine Agr. Rev. [English Ed.], 2 (1909), No. 7, pp. 395–404*).—A brief account of the author's experience in growing the Ceara rubber tree (*Manihot glaziovii*) on Basilan, Philippine Islands. Consideration is given to germination and planting, pruning, tapping, coagulation, the raw rubber, and soils. Fifty trees 3½ years old when tapped yielded a total of 5 lbs. of rubber. Each tree was tapped 3 times, thus giving a little over ½ oz. per tree for each tapping.

A list of the trees of the State of Florida, J. GIFFORD (*Cocoanut Grove, Fla., 1909, pp. 24*).—This consists of a list of some 281 species which are either native to or have been introduced into Florida. Both the botanical and common names are given, and the locality as well as the economic value of the more important species are indicated.

Native trees of the Hudson River Valley, N. TAYLOR (*Bul. N. Y. Bot. Garden, 7 (1909), No. 23, pp. 90–147, pls. 20*).—This consists of a descriptive list of trees known to grow naturally in the counties of New York and New Jersey bordering the Hudson River.

Forest flora and forest resources of Portuguese East Africa, T. R. SIM (*Aberdeen, 1909, pp. VI+166, pls. 100*).—This is a handbook of the forest flora of Portuguese East Africa published under the authority of the Mozambique Government and based on the author's observations, together with other available data. The work is indicative of the forest wealth of that region. Part 1 contains a general description of the country, and of the forests relative to their constitution and locality, synoptical and specific botanical descriptions of the forest flora, and an account of the timbers and miscellaneous economic products

with recommendations concerning their exploitation and utilization. Part 2 consists of a hundred botanical drawings illustrating 158 species.

Forest statistics (*Canada Yearbook, 2. ser., 1908, pp. 106–113*).—Statistics are given for the various provinces of Canada showing the production of timber, logs, wood, and minor forest products for the decennial periods 1871–1901, the value of the various forest products for the year 1901, and the values of forest products exported from Canada in the 5 fiscal years 1904–8.

Annual administration report of the Forest Department of the Madras Presidency for the twelve months ending the 30th of June, 1908 (*Admin. Rpt. Forest Dept. Madras, 1908, pp. 96+CXXVI+13*).—This is a progress report relative to the constitution, management, and administration of the state forests in the northern, central, and southern circles of the Madras Presidency, including financial statements for the year. The data relative to areas, progress in forest surveys and working plans, routine administration work, forest products, revenues, expenditures, etc., are appended in tabular form.

Impregnation of beech ties with copper arsenite, N. von Lorenz (*Centbl. Gesam. Forstw., 35 (1909), No. 8–9, pp. 388–390*).—The author describes a method of impregnating beech ties with an ammoniacal solution of copper arsenite. The advantage claimed for the use of this material is that its preservative constituent does not become washed out of the ties by rains as in the case of copper sulphate, zinc chlorid, tar-oil, etc.

DISEASES OF PLANTS.

Annual report on plant diseases, M. Hollrung (*Jahresber. Pflanzenkrank., 10 (1907), pp. X+402*).—This report, published in 1909, gives a review of the literature which appeared in 1907 relating to plant diseases and insect pests, about 1,400 titles being noted.

While the total number of papers is less than in the previous volume (E. S. R., 20, p. 758), a greater number of the articles are abstracted at some length. The general arrangement and treatment of topics are similar to those in previous reports. The author expressly desires investigators to send to him, at the University of Halle, Germany, for review all papers published by them on plant pathology, economic entomology, and kindred topics.

The diseases of plants due to mineral substances in the soil, C. Roux (*Ann. Soc. Bot. Lyon, 33 (1908), pp. 1–41*).—A critical review is given of literature relating to plant injuries attributed to the presence or absence of mineral substances in the soil. The studies begin with the absorption of mineral salts by plants, after which are described the poisonous action of different groups of minerals and the injurious action of an excess of water, acids, organic materials, etc. in the soil. An attempt is made to classify these injuries according to their causes. A bibliography of more than 200 works completes the paper.

Report of the plant pathologist, I. B. P. Evans (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 120–134*).—Notes are given on the principal diseases of economic plants observed during the season covered by the report, together with suggestions for their control as far as definite means are known.

The results of some experiments to test the susceptibility of Indian wheats to rust in the Transvaal are briefly given, the experiments having extended over several years, and in all 13 varieties having been tested. All of these varieties are claimed to be more or less rust resistant in India, but all were affected with *Puccinia graminis*, and several of the varieties were literally brown with the rust. In addition to the species *P. graminis*, *P. triticina* also attacked the plants.

Infection experiments were carried on with a number of local rust-proof wheats, but none of them showed immunity to the rust *P. triticina*, and only one toward *P. graminis*. As a result of his studies the author thinks that rust-proof and rust-resistant are terms that should be used with great caution.

Diseases and pests of cereals, H. PYE (*Jour. Dept. Agr. Victoria, 7 (1909), No. 6, pp. 368–373*).—The results of observations are given on the occurrence of wheat smuts, and experiments on the production of smut-resistant varieties of cereals are described. Comparative tests have been carried on with varieties of wheat in regard to their resistance to the stinking smut, and decided differences are noted in their susceptibility to the fungus attack. A durum variety, Medeah, has proved almost entirely free from this disease. Some other varieties proved resistant to a considerable extent, although not entirely immune.

In the report of the experiments the relative values of different treatments for the prevention of smut and effect of fungicides on germination are given. Soaking the seed in corrosive sublimate solution or a strong solution of copper sulphate proved the best treatment for the prevention of the smut, while the tests to determine the effect of these fungicides on germination were so variable as to be inconclusive. The results of breeding experiments with different varieties of wheat to produce smut resistance are briefly described.

The mildews of cereals, G. M. REED (*Bul. Torrey Bot. Club, 36 (1909), No. 7, pp. 353–388*).—In a previous paper (E. S. R., 21, p. 50), the author has given a summary of the work that has been done on the physiological specialization of the Erysiphaceæ. In the present paper an account is given of investigations with the mildews of barley, rye, wheat, and oats that supplement those previously described (E. S. R., 18, p. 244).

In the experiments the author has obtained all of the available species and forms of Triticum, Secale, Hordeum, and Avena, and cross inoculations have been made with conidia. So far as tested all species of Avena are susceptible to the oat mildew. All varieties of *Triticum vulgare* are likewise susceptible to the wheat mildew. There were, however, certain varieties of *T. dicoccum* which were practically immune to the wheat mildew, while other varieties of this same species were quite susceptible. Some species of Hordeum were found immune to the barley mildew, and the same seems to be true of certain species of Secale with reference to rye mildew. It appears that under normal conditions there are well-defined forms of *Erysiphe graminis* occurring on the different species of each of the 4 cereals enumerated above. Some interesting facts were brought out relating to the susceptibility of a hybrid between the rye and wheat, this hybrid proving resistant to both the rye and wheat mildew.

A brief bibliography of literature relating to this subject is given.

Experiments relating to rust and smut resistance, D. MCALPINE (*Jour. Dept. Agr. Victoria, 7 (1909), No. 4, pp. 255–260, figs. 2*).—Preliminary experiments have been conducted in testing varieties for rust resistance and for liability to stinking smut, and with the flag smut of wheat. In connection with the rust, the investigations involved both *Puccinia triticina* and also *P. graminis*, the latter being by far the more destructive.

In testing for smut resistance the author sought to confirm the claims made that the varieties Florence and Genoa are practically smut proof, and that as a consequence the seeds do not require treatment with fungicides for the prevention of smut. In the experiments reported seed was dusted with spores of stinking smut prior to sowing. The results obtained upon tabulation showed that Florence may have as much as 12 per cent and Genoa 62 per cent of stinking smut, although on a whole they are fairly resistant. This seems to dispose of the claim of hereditary resistance on the part of these varieties. The author

states that rapidity of germination is correlated with the resistance to the stinking smut, and that these two varieties germinate relatively rapid, hence their partial freedom from disease.

The experiments with flag smut were largely to identify the species occurring on wheat. This disease is widely distributed in portions of Australia, and in some cases is said to reduce the crop considerably. The smut not only infects the young seedlings, but infection also occurs through diseased straw. It has been believed that the species in Australia occurring on wheat was identical with that occurring elsewhere on rye, but inoculation experiments showed that the fungus could not be transferred from rye to wheat. The species occurring on wheat in Australia is said to be *Urocystis tritici*.

Bunt, or stinking smut of wheat, F. D. HEALD (*Insect Pest and Plant Disease Bur. Nebr. Bul. 2, pp. 8, figs. 3*).—A description is given of the stinking smut of wheat (*Tilletia foetans*), and for its prevention the treatment of seed with formalin is recommended.

Methods of combating the smut diseases of cereals, O. APPEL (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 2, pp. 319–333*).—In an address before an agricultural conference, the author gives an account of the various smut diseases of cereals, and describes the different methods for combating them. These include the soaking of the seed with chemicals, such as copper sulphate, formalin, etc., and the hot-water treatment in its regular and modified forms.

Anthracnose of beans, E. M. WILCOX and C. E. TEMPLE (*Insect Pest and Plant Disease Bur. Nebr., Div. Bot. Circ. 6, pp. 4, figs. 3*).—Popular descriptions are given of the bean anthracnose due to *Colletotrichum lindemuthianum*, together with suggestions for the prevention of injury due to that fungus. The methods suggested are the planting of clean seed, which may be obtained by the selection of unspotted pods, and care in not disturbing the plants while they are in a moist condition. All diseased plants should be removed and burned as soon as the presence of the fungus becomes evident.

Observations on some diseases of beets, GRIFFON and MAUBLANC (*Bul. Trimest. Soc. Mycol. France, 25 (1909), No. 2, pp. 98–107, fig. 1*).—The authors from time to time have carried on studies with forage and sugar beets, and in 1907 and 1908 were able, on account of the peculiar seasonal conditions, to determine the influence of drought and humidity on the diseases to which these plants are subject. Among those reported upon in the present paper are the heart rot of beets, leaf diseases, and root tumors.

According to their observations, the heart rot is most prevalent in dry seasons, when it is particularly abundant in clay soils underlaid at a little depth by an impermeable stratum. The persistence and localization of the heart rot to certain soils, they think, indicates that the parasite lives in the soil. The fungus most commonly reported as causing this disease is *Phoma tabifica*, and the authors think that a lack of water and unfavorable soils render the crop more subject to its attack. As impermeable soils seem to contribute to the conditions best suited to this disease, it is recommended that either beets should not be cultivated in such soils or that means should be taken for their improvement. In a series of experiments in which beets were sprayed with copper fungicides for the control of this disease, but little trouble was experienced with either the sprayed or checked plants. This may have been due to the season, which was a very moist one.

Of the leaf diseases those described are the rust (*Uromyces betæ*), mildew (*Peronospora schachtii*), and leaf spot (*Cercospora beticola*). In addition to these fungi the author reports the frequent presence of *Ramularia beticola*, and it is thought that this fungus at times occasions considerable loss.

The root tumor, which is said to attack particularly sugar beets, has been attributed to a number of causes, that most commonly occurring being the fungus *Urophlyctis leproides*.

The end or fiber rot of ginseng seedlings, H. H. WHETZEL (*Spec. Crops, n. ser., 8 (1909), No. 84, pp. 143–147, figs. 2*).—A description is given of a disease of ginseng seedlings due to *Thielavia basicola*. This fungus not only attacks the seedling roots but also causes a destruction of the older plants. The symptoms by which this disease may be recognized are premature discoloration of the foliage, followed by a bronzing or yellowing of the leaves which finally take on a reddish tinge as though ripening in autumn. In general 2 and 3 year old plants are found to suffer more seriously than older ones. Upon the young plants it results in the decided stunting of the root growth.

On the basis of other investigations for the control of this fungus, the author recommends the application of any substance that will reduce the alkalinity of the soil. Experiments have shown that acid phosphate is quite effective.

Dry rot of the potato, C. P. LOUNSBURY (*Agr. Jour. Cape Good Hope, 35 (1909), No. 1, pp. 42–48, figs. 3*).—An account is given of the dry rot of the potato, which is also known as "stem-end rot," "white rot," and "winter rot," and is attributed to the fungus *Nectria solani*. Attention is called to similar diseases due to *Fusarium solani* and *F. oxysporum*, and the statement made that the Fusariums are probably the conidial phase of Nectria. The importance of the disease as it occurs in South Africa is pointed out, the infection apparently having been introduced on imported seed. Suggestions are given for the prevention of loss due to this fungus, the means adopted being rotation of crops, the use of healthy seed, the destruction of all diseased tubers, and the storing in cool, well-ventilated places of all suspected potatoes.

Brown rot or twig blight, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 20 (1909), No. 3, p. 202*).—The author notes the sudden appearance in several districts of New South Wales of the brown rot fungus (*Monilia fructigena*). On examination many twigs and leaves were found to be dead, but the fungus seemed to have been checked in its spread by the hot weather. Nectarines suffered particularly from this disease, and peaches and Japanese plums were injured to some extent.

Two prevalent cherry diseases, W. H. HEIN (*Insect Pest and Plant Disease Bur. Nebr., Div. Bot. Circ. 2, pp. 4, figs. 2*).—Popular descriptions are given of the powdery mildew (*Podosphæra oxyacanthæ*) and the cherry shot-hole disease caused by the fungus *Cylindrosporium padi*, together with suggestions for their control.

A fungus-like appearance on imported and exported apple trees, D. MCALPINE (*Jour. Dept. Agr. Victoria, 7 (1909), No. 7, pp. 435–439, figs. 5*).—A description is given of a fungus-like appearance that was observed on branches and stocks of apples occurring in Australia or imported into the Transvaal. The presence of this peculiar development resulted in the rejection of a large importation as infected with some fungus, but a study by the author showed that it was due to an abnormal development of lenticels, from which there was exuded a loose white powder which gave the impression of spores of a fungus.

Bitter pit of the apple, D. MCALPINE (*Jour. Dept. Agr. Victoria, 7 (1909), No. 7, pp. 439–441*).—The author calls attention to the bitter pit of the apple, a rather common disease in Australia which is believed to be identical with that described by Brooks as fruit spot of apples (E. S. R., 20, p. 847).

Downy mildew of the grape, W. H. HEIN (*Insect Pest and Plant Disease Bur. Nebr., Div. Bot. Circ. 4, pp. 6, figs. 3*).—A description is given of the

downy mildew of the grape due to *Plasmopara viticola*, with notes for its control by means of spraying.

Treatment of downy mildew, Belle and Fondard (*Rev. Vit., 32 (1909), No. 812, pp. 47, 48*).—Suggestions are given for the prevention of attacks of the downy mildew of grapes.

The authors claim that in ordinary seasons 3 sprayings are sufficient, the first application to be made when the new shoots are 12 to 15 cm. in length, the second immediately after flowering, and the third when the grapes begin to ripen. The second treatment is considered the most important, and in unfavorable years two or more sprayings should be given the vines after the second application. The authors recommend various fungicides to which sugar, soap, and other adhesives are added, but they prefer one in which resin is a component. This fungicide is prepared by dissolving 0.5 kg. of carbonate of soda in 4 or 5 liters of water to which is added an equal weight of resin. This is then thoroughly mixed with 10 to 15 liters of water containing a solution of 1 per cent copper sulphate, and the whole is brought, by the addition of water, to 100 kg. The carbonate of soda may be replaced by lime, but the authors prefer the purest form obtainable of carbonate of soda. This fungicide is very adhesive, and as prepared it has neutralized the sulphate of copper.

When exceedingly severe attacks of the disease are suspected it is recommended that for some of the earlier treatments a copper acetate solution be substituted for the other fungicide.

The blister rust of pines and the European currant rust, G. G. Atwood (*N. Y. Dept. Agr., Hort. Bul. 2, pp. 15, pls. 2*).—A report is given on the blister rust of pines (*Peridermium strobi*), which was found on a number of 3-year-old seedlings imported in 1909. This is one of the stages in the life cycle of the fungus, the other occurring on currants and gooseberries. On the currant this disease has been previously reported by Stewart (E. S. R., 18, p. 747) and the account given of this stage of the fungus is practically a reprint from that source.

Following the recognition of this new fungus on imported stock, a meeting was held of plant pathologists, foresters, and others, in which the situation was discussed and conclusions reached regarding the control of the disease. It is recommended that all premises be inspected, and that wild and cultivated gooseberries and currants be destroyed within 100 yds. of where any of the introduced white pines have been planted. A close watch should be kept on cultivated strawberries and gooseberries, as well as on all the suspicious pine trees, and all affected plants should be destroyed by burning. It is especially important that the currants and gooseberries be examined in the summer or fall, as they would not be expected to show signs of the disease until after July 15.

Peridermium strobi in America, P. Spaulding (*Science, n. ser., 30 (1909), No. 763, pp. 200, 201*).—The author reports having found in June specimens of white pine affected with the leaf blister due to *P. strobi*. Later investigations have shown that this fungus is present on imported stock in New York, Vermont, Massachusetts, and Connecticut, and there appears to be no doubt that it was present in the German nurseries from which the trees were obtained.

Cedar rust, W. H. Hein (*Insect Pest and Plant Disease Bur. Nebr., Dir. Bot. Circ. 1, pp. 4, figs. 4*).—A popular account is given of the cedar rust (*Gymnosporangium macropus*), and its relation to the apple leaf rust pointed out. Suggestions are given for the treatment of these diseases, which consists of removal of the cedar trees and the planting of the more resistant varieties of apples. Thorough spraying has been recommended as a treatment, but investi-

gations carried on at the Nebraska Station failed to show that any decided advantage accrued from the application of Bordeaux mixture.

The appearance of the oak mildew in Sologne, E. Noffray (*Jour. Agr. Prat., n. ser., 18 (1909), No. 28, pp. 81, 82*).—Attention is called to the reappearance of the oak mildew, attributed to *Oïdium quercinum*, which has proved quite destructive to young oak trees, particularly those grown in coppice, for the last 2 or 3 years in parts of Europe.

The so-called canker of poplar trees, P. Hoc (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 30, pp. 116–120*).—A variety of Canada poplar, which is extensively planted in parts of France on account of the rapidity of its growth and the quality of its wood, is said to be more or less subject to a canker disease which is attributed to the action of bacteria. This disease is characterized by the canker-like growths formed upon the branches, in which the wood and pith are destroyed. The change brought about in these tissues is not limited to the canker spot but follows along the fibro-vascular bundles for a considerable distance. A prominent swelling surrounds the canker which is characterized by a depressed center which forms the canker proper. It is said to be not uncommon that perfectly sound trees are found associated with those that have been completely destroyed by the disease.

It is suggested that where it is possible the affected branches should be cut out and destroyed. If it is desired to replant, other varieties that are not susceptible to the disease should be used.

A disease of rose twigs (*Dept. Agr. Trinidad, Bul. Agr. Inform., 1909, n. ser., No. 63, p. 91*).—A brief account is given of a disease of rose twigs in which the fruiting bodies of a species of Stilbella were found. The disease was shown to be readily transmitted through inoculation experiments, and for its control it is recommended that the diseased twigs be cut back and the bushes thoroughly sprayed with Bordeaux mixture or lime sulphur solution.

Spraying calendar (*Insect Pest and Plant Disease Bur. Nebr. Bul. 1, pp. 12, figs. 2*).—Formulas and directions for preparation are given for a number of the more common fungicides and insecticides, and a tabular statement presented showing the times for application and the fungicides and insecticides to be used for the principal insect and fungus pests of many economic plants.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Directory of officials and organizations concerned with the protection of birds and game, 1909, T. S. Palmer (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 70, pp. 16*).—This is the tenth annual directory of officials and organizations concerned with the protection of birds and game in the United States and Canada (E. S. R., 20, p. 455). The addresses are grouped under the headings state officials, national organizations, state organizations, and Audubon societies.

Annual review of investigations in general biology (*Ann. Biol. [Paris], 11 (1909), pp. XLII+508*).—This volume contains abstracts of the most important articles published during 1906 relating to heredity, variation, cellular biology, origin of species, geographical distribution, and biological theories.

The balance of nature, G. Abbey (*London, 1909, pp. XLV+278, figs. 150*).—This is a practical manual in which mammals, birds, and reptiles are considered. Particular attention is given to methods of destruction, including trapping, poisoning, etc.

The rat problem, W. R. Boelter (*London, 1909, pp. VII+165, figs. 75*).—Chapters are presented on the natural history of the rat, the economic loss caused by rats, the rôle played by the rat in the dissemination of disease, and

the means for the extermination of rats. An appendix is devoted to the rat laws of Barbados, Antigua, Hongkong, and Denmark, and to a draft of the proposed English rat law. A bibliography is appended.

Distribution of the rat plague in Mexico, C. Macías (*Bol. Com. Par. Agr., 4 (1908), No. 3, pp. 218–363*).—In response to circulars sent out information was obtained which is here presented by States. A list is given of the small rodents, the identifications of which were made by E. W. Nelson. It is estimated that these pests cause an annual loss in Mexico of about $5,000,000.

The economic value of some common birds, N. Criddle (*Nor'-West Farmer, 28 (1909), No. 13, pp. 748, 750, 751, figs. 4*).—An account of some of the more important birds of the Northwest, including the black-billed cuckoo, northern hairy woodpecker, yellow-bellied sapsucker, northern flicker, whippoorwill, nighthawk, kingbird, horned larks, and blue jay.

Birds of the Boston public garden, H. W. Wright (*Boston and New York, 1909, pp. XX+238, pls. 8*).—A record of the occurrence of birds, based on observations extending over a period of 9 seasons.

The birds of Washington, W. L. Dawson and J. H. Bowles (*Seattle, 1909, vols. 1, pp. XV+1–458, pls. 14, figs. 168; 2, pp. III+459–996, pls. 16, figs. 193*).—A scientific and popular account of the 372 species of birds found in the State of Washington. Analytical keys to the orders, families, and species prepared by L. Jones and a British Columbia supplement with annotations by A. Brooks are appended to the work.

Index to the Bulletin of the Cooper Ornithological Club and the Condor, 1899–1908, H. B. Kaeding (*Los Angeles, Cal., 1909, pp. 48*).—This is an index to the first 10 volumes published by the Cooper Ornithological Club, of which the first volume bears the title *Bulletin of the Cooper Ornithological Club*, the remainder being known as *The Condor*.

Pearls and parasites, A. E. Shipley (*London, 1908, pp. XV+232, pls. 8*).—This is a collection of essays, most of which have been issued separately. The papers presented discuss pearls and parasites; zebras, horses, and hybrids, in which are considered telegony, heredity, etc.; Pasteur, including a history of his investigations on fermentation, silkworm disease, anthrax, and rabies; malaria, including an account of mosquitoes and their rôle in disease transmission; flies and ticks, and the diseases which they carry, etc.

Beneficial parasites, L. J. Newman (*Jour. Dept. Agr. West. Aust., 18 (1909), No. 5, pp. 377–383*).—An account of the parasites of importance in the control of insect pests in Western Australia, California, and Hawaii.

Long-lived parasites, L. J. Newman (*Jour. Dept. Agr. West. Aust., 18 (1909), No. 4, p. 297*).—Codling moth cocoons parasitized by *Caliephialtes messer* were sent from Spain to California and kept in cold storage for 14 months. Three weeks after removal from cold storage the parasites commenced to emerge.

Report on economic entomology [in the Sudan], H. H. King (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 201–248, pls. 10, figs. 4*).—Under animals injurious to man and animals the author considers the mosquitoes, simulids, tabanids, and tsetse flies; the insects causing myiasis, including the tumbufly (*Cordylobia anthropophaga*), and the Congo floor maggot (*Auchmeromyia luteola*); the insects injurious by means other than by blood sucking, including filth-feeding flies and blister beetles, and the Acarina, including the fowl tick (*Argas persicus*), the human tick (*Ornithodoros savignyi*), and scaly leg, due to *Sarcoptes mutans*.

Under animals injurious to farm and garden crops the author discusses the dura stem borer (*Sesamia cretica*), which is said to be one of the worst pests from which dura and maize suffer; the White Nile army worm (*Remegia frugalis*), the cockchafer (*Rhinhyptia*, sp.), the dura plant bug (*Lygæus militaris*),

the andata bug (*Agonoscelus puberula*), the asal fly (*Aphis sorghi*), and a millipede attacking dukhn. The animals injurious to cotton include the Egyptian cotton boll worm (*Earias insulana*), which is very common in the Sudan and is responsible for considerable yearly loss to the cotton growers; the Sudan cotton boll worm (*Diparopsis castanea*), cotton flea beetles (*Nisotra uniformis* and *Aphtona*, sp.), the cotton root and stem borer, the Egyptian cotton stainer (*Oxycarenus hyalinipennis*), and the cotton aphis (*Aphis malvæ*). Animals injurious to cucurbits include the melon ladybird (*Epilachna chrysomelina*), the melon weevil (*Baridius*, sp.), the melon stem borer, melon fruit fly (*Dacus*, sp.), and the melon plant bug (*Aspongopus viduatus*).

The Berseem worm (*Caradrina exigua*) is injurious to alfalfa, and the green molokhia worm (*Gonitis involuta*) and the red molokhia worm (*Tarache tropica*) are destructive to jute. The migratory locusts (*Schistocerca peregrina* and *Acridium ægyptian*) are said to be the most important of all the insect pests from which the agriculturists in the Sudan suffer.

The orange tree butterfly (*Papilio demoleus*), rose chafers (*Pachnoda savignyi* and *Stalagnosoma cynanche*), and the date scale (*Parlatoria* [*Websteriella*] *blanchardi*) are mentioned as injurious to trees and shrubs. The animals mentioned as injurious to stored goods are the horn beetle (*Dermestes vulpinus*), the clothes beetle (*Anthrenus vorax*), a seed beetle (*Attogenus*, sp.), the confused flour beetle (*Tribolium confusus*), the saw-toothed grain beetle (*Silvanus surinamensis*), cigarette beetle, bean weevil, rice weevil, and the grain weevil. Those mentioned as injuring timber are *Sinoxylon senegalense*, white ants, and the shipworm. Notes are also presented on several fungus pests and brief mention is made of the occurrence of *Cimex lectularius* and *rotundatus*.

Report of the entomologist, C. W. Howard (*Transvaal Dept. Agr. Ann. Rpt. 1908, pp. 164–209, pls. 5, fig. 1*).—The principal work during the year was connected with brown and red locust destruction. Brown locusts were as numerous as during the previous year. The size of the invading swarms was unusually large, one having been fully 15 miles across its front and requiring between 2 and 3 days to pass a certain point. A great deal of success was due to preparations for the work having been made long before the first rains appeared. Locust birds are increasing in numbers.

The importation of Italian bees during the season was very successful. It is said that the department is now in a position to commence in a small way the foundation of the silk industry among the people. The insect pests of corn were more noticeable than for several years previous, the cornstalk borers beginning to appear in November and destroying from 25 to 50 per cent of the plants. The mealy stalk borer or mealy grub (*Sesamia fusca*) was first noticed through the tops of young plants withering and turning to a brown scorched color, due to the heart being eaten out of the plants. Scale insects upon citrus trees are demanding considerable attention. Fumigation is considered the most satisfactory remedy, and it is said that the more well-to-do farmers of the colony are now readily adopting this system. Larvæ of the orange codling moth (*Enarmonia batrachopa*) can be found in oranges, naartjes, and lemons at almost any time of the year.

Observations made during the year show that there are at least 3 generations of the citrus psylla (*Trioza* sp.) each year in the Transvaal. The codling moth is present in the colony in only one small place and every effort is being used to keep it from becoming established. The greatest danger lies in the introduction of apples, pears, and quinces from Cape Colony. The woolly aphis still continues to cause a great deal of trouble as there are still a great number of apple trees which are not on blight-proof stock and which harbor the insect and furnish a source of infestation. Cockchafer beetles are becoming more

noticeable in the colony, there being 5 species that are particularly injurious to orchard trees. In orchards where fruit moths (*Ophiusa catella*) were abundant a large percentage of the fruit was destroyed. But few fruit flies (*Ceratitis capitata*) were noticed during the season.

The aphis which attacks peaches, plums, and nectarines is becoming more widespread. The Australian bug (*Icerya purchasi*) continues to attract a great deal of attention from fruit growers, but only in a few cases has it become abundant enough to be considered extremely dangerous. It is said that the fig and willow borer (*Phryneta spinator*) will continue to prove a pest of trees, troublesome to deal with, so long as people persist in growing figs as shrubs and not as trees. A fig curculio was discovered for the first time, and is probably *Metatyges turritus*, which has been reported from Natal.

Cutworms have been the source of greatest injury to field and garden crops. Ground or corn crickets (*Brachytrypes membranaceous* and *Carconopsis* sp.) were the source of injury to crops in those portions of the colony where the soil is very loose and sandy. *Heliothis armiger* is found in nearly every part of the Transvaal in greater or less abundance and is destined to become a serious pest. A cotton stainer (*Dysdercus* sp.) appeared during the year. Eelworms, or gall worms, continue to be a source of injury in certain portions of the colony.

The use of a machine for fumigating the nests of white ants is being widely adopted by people in the Transvaal and has proved its superiority above every other method of destruction which can be employed for white ants which form a large nest. Several instances of houses having been attacked by these ants came to the author's notice during the year.

Report of the acting government entomologist, F. E. West (*Admin. Rpts. Roy. Bot. Gard. Ceylon, 1908, Ed., Sci., and Art, pt. 4, pp. C 2, C 3*).—The pests reported as injuring the tea plant are the shot-hole borer (*Xyleborus fornicatus*), which appears to have spread considerably during the last 2 years and to have damaged every estate which it has attacked; termites (*Calotermes militaris*), which are responsible for considerable damage; the nettle grub (*Thosea recta*), which was the source of considerable injury in the Uva district, where it has occurred periodically for many years; the red slug (*Heterusia cingala*), which was injurious in two districts; the yellow mite (*Tarsonymus translucens*); the scarlet mite (*Brevipalpus obovatus*); the green bug (*Lecanium viride*); and the brown bug (*L. coffeæ*).

Ants and termites were responsible for injury to rubber trees. Spraying for canker on the cacao killed off the Helopeltis. The introduction of *Clerus formicarius* to prey upon the shot-hole borer is under way. It is estimated that two-thirds of the island is undermined by termites. An ant exterminator which was employed is said to have entirely cleared out the nests by killing the ants. An investigation was made of the house-fly nuisance at Colombo.

Insect pests and their foes, W. W. Froggatt (*Jour. Dept. Agr. So. Aust., 11 (1907), No. 4, pp. 382–386; 11 (1908), No. 6, pp. 583–587; 12 (1908), Nos. 1, pp. 33–40; 2, pp. 137–141; 5, pp. 467–472; 12 (1909), Nos. 7, pp. 615–621; 9, pp. 773, 774*).—The reports here presented were submitted by the author during a tour of the world, on which he was sent at the joint expense of all the states of Australia, except West Australia, in order to investigate insect pests, more particularly in relation to their parasitic and predaceous foes. This report is of particular interest to the entomologist since it contains information on the present status of economic entomology in the lands which the author visited, namely, Hawaii, the United States, Mexico, the West Indies, England, France, Spain, Austria, Hungary, Italy, Turkey, Cyprus, Egypt, India, Ceylon, etc.

Report of orchard demonstrations by counties, H. A. Surface (*Zool. Bul. Penn. Dept. Agr., 6 (1909), No. 12, pp. 401–423*).—In addition to the report of spraying demonstrations by counties, insect specimens received during February and March, 1909, are listed.

Biologia Centrali-Americana. Insecta. Orthoptera (*London, vol. 1, 1893–1899, pp. X+458, pls. 22; vol. 2, 1900–1909, pp. VIII+412, pls. 8; rev. in Nature [London], 80 (1909), No. 2061, pp. 241, 242*).—The first volume, which treats of the Forficulidæ, Blattidæ, Mantidæ, Gryllidæ, and Locustidæ, began to appear in 1893 and was completed in 1899. The volume was prepared by Dr. H. de Saussure, assisted by L. Zehntner and A. Pictet. Volume 2, bearing the dates 1900 to 1909, contains a monograph on the Acridiidæ by L. Bruner and A. P. Morse, and a list of the Phasmidæ compiled by R. Shelford.

The rice bug (Leptocorisa varicornis), H. M. Leefroy (*Mem. Dept. Agr. India, Ent. Ser., 2 (1908), No. 1, pp. 13, pl. 1*).—This pest is a source of injury to rice in India when the grain is forming and the seeds full of milky juice. The bugs gather on the rice ears and suck out seed after seed. Such ears turn wholly or partly white, little or no grain being formed.

Pemphigus venafuscus n. sp., Edith M. Patch (*Ent. News, 20 (1909), No. 7, pp. 319–322, pl. 1*).—This new species was taken from the lilac, elm, and red ash in October at Orono, Me. On the red ash they are said to seek the ash clusters of the gall mite *Eriophyes fraxiniphila*, where they deposit the true sexes as well as in the rough bark. In these situations on the bark and in ash clusters minute males and females molted and mated, and the winter eggs were subsequently laid. The author reports this as the first time that she has found the same species of Pemphigus choosing widely different host plants for the same stage.

American snowball louse (Aphis viburnicola n. sp.), C. P. Gillette (*Ent. News, 20 (1909), No. 6, pp. 280–285, pl. 1*).—Detailed descriptions of the stages of a new species which attacks *Viburnum opulus* in Colorado.

Aphid technique, P. Hayhurst (*Ent. News, 20 (1909), No. 6, pp. 255–260*).—The author has found a 70 per cent solution of alcohol to be the most satisfactory means for permanently preserving aphids. The more delicate species should be placed in a 35 per cent solution for several hours before transferring to the 70 per cent alcohol. It is stated that aphids preserved in about 2½ per cent formalin can be absolutely depended upon not to shrink. If the aphids are fixed in hot water at about 80° C., pricked when sufficiently hard, and kept in the dark, they will partly retain their normal color.

Two scale pests of laurel, L. Lindinger (*Ztschr. Pflanzenkrank., 18 (1908), No. 6, pp. 321–336, pl. 1, figs. 2*).—The biology, distribution, and economic importance of *Aspidiotus britannicus* and *Aonidia lauri* are here considered. A bibliography for each species is appended.

Scale insects from the south of France and from Corsica, P. Marchal (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 13, pp. 871, 872*).—Four species are here described as new to science.

Notes on the scale insects of Europe and northern Africa, I, P. Marchal (*Ann. Soc. Ent. France, 77 (1908), No. 2, pp. 223–309, figs. 46*).—In this article the author considers species of the Coccinæ and Lecaninæ. *Pseudococcus citri* var. *coleorum*, common on Coleus in the gardens near Paris, and observed at Lausanne, Switzerland, and *Phenacoccus cholodkovski* from the roots of wheat (*Triticum vulgare*) in central Russia, are described as new.

Destruction of Lecanium hesperidum by Sporotrichum globuliferum, J. de Camara Pestana (*Bul. Soc. Portugaise Sci. Nat., 2 (1908), Nos. 1–2, pp. 15–18, pl. 1*).—A preliminary account of investigations as to the value of the fungus

S. globuliferum in the destruction of the soft scale (*Coccus* [*Lecanium*] *hesperidum*).

Destruction of Lecanium oleæ by Sporotrichum globuliferum. J. DE CAMARA PESTANA (*Bul. Agr. Algérie et Tunisie, 15 (1909), No. 6, pp. 146–148, figs. 2*).—This is apparently the same account as the above except that a different host is given.

The Aleyrodidæ of Barbados. C. C. GOWDEY (*West Indian Bul., 9 (1908), No. 4, pp. 345–360, figs. 5*).—Insects of the family Aleyrodidæ are said to be very plentiful in Barbados and the other West Indian islands. Nearly all of the species are omnivorous and through such habits may become of considerable economic importance. Tables for the separation and description are given for the 3 species of Aleyrodicus and 8 species of Aleyrodes reported from the West Indies.

Miscellaneous papers. A new genus of Aleyrodidæ, with remarks on Aleyrodes nubifera, and A. citri. A. L. QUAINTANCE (*U. S. Dept. Agr., Bur. Ent. Bul. 12, tech. ser., pt. 9, pp. 169–174, figs. 2*).—The new genus Paraleyrodes is erected for a species of white fly occurring on *Persea carolinensis* in Florida which was formerly described as *Aleyrodes perseæ*. During the course of the investigations in Florida of the citrus white fly *P. perseæ* has frequently been found upon the orange, avocado pear, and persimmon (?). A parasite bred from the species has been given the manuscript name *Encarsia variegatus*. Collection records are given showing *A. nubifera* to occur in various localities in North Carolina, Florida, Mississippi, Louisiana, and Cuba. It is stated that previous records of *A. citri* from Cuba are incorrect and that all apparently refer to *A. nubifera*. Specimens of *A. citri* in the Bureau of Entomology of this Department were received from China and Japan and it has recently been determined that *A. aurantii*, described by Maskell, from the northwestern Himalayas in India is a synonym of *A. citri*.

The classification of the phylloxera. B. GRASSI and ANNA FOÁ (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 17 (1908), II, No. 12, pp. 683–690*).—Notes on the classification of the phylloxera. There are said to be 9 species in Italy besides the grape phylloxera.

The cultural treatment in combating the phylloxera. A. WANNER (*Weinbau u. Weinhandel, 26 (1908), Nos. 39, p. 354; 40, pp. 362, 363*).—A discussion of methods applied in dealing with this pest.

Papers on deciduous fruit insects and insecticides. Additional observations on the lesser apple worm. S. W. FOSTER and P. R. JONES (*U. S. Dept. Agr., Bur. Ent. Bul. 80, pt. 3, pp. 45–50, pl. 1*).—The information here presented, which is additional to that previously noted (E. S. R., 19, p. 858), is based upon studies made at Siloam Springs, Ark., and in the insectary at Washington, D. C.

During the spring of 1908 the larvæ of *Epinotia pyricolana* were found feeding in the apples and plums around Siloam Springs. In July and August adults were reared in numbers from larvæ found in young vigorous growing shoots and water sprouts of apple trees. Most of the injury to the twigs, however, was done in June and July. Many observations made by the authors indicate that a large part of the first brood larvæ matures in the fruit, that the remainder of the first brood and also the second brood mature in the young twigs and water sprouts, and that the larger part of the later brood goes back again to the fruit. During the season the authors were unable to obtain a single specimen of *Enarmonia prunivora* from twigs of the apple, but all specimens taken appeared to be *Epinotia pyricolana*.

The injury caused by the lesser apple worm early in the season is not so pronounced nor are the larvæ so abundant as those of the codling moth, but by midsummer and fall there is a marked increase in the number of larvæ of this

species over that of the codling moth. This increase is often sufficient to bring the total number of the lesser apple worms, in the fruit for the season, in excess of the codling moth larvæ.

Overwintering larvæ of the lesser apple worm have been found in the cracks and crevices of the barks of trees and also in fruit and barrels which had been stored over winter. They have also been found in great abundance in late fall in the partly devoured fruit of Cratægus, both on the trees and on the ground. Many larvæ passed the winter in the Cratægus fruit in breeding jars, and this overwintering habit very probably obtains under natural conditions. The moths from overwintering larvæ emerge about the same time as those of the codling moth. In the Ozark region the first brood of larvæ matures usually during the month of June, moths from the second brood of larvæ emerging in 1908 from June 20, to July 30. From the evidence at hand it appears that there are 3 full generations annually in the Ozark region.

Individual records kept from 120 eggs during July, August, and September gave the minimum time of incubation as 4⅛ days, and the maximum 5½ days. The length of the larval period from the time of hatching to leaving the fruit varied from 13 to 15 days in July and from 20 to 27 days in August and the first half of September, and increased to from 30 to 50 days after the middle of September to early November. From about 100 specimens allowed to spin cocoons in ends of apples, either at the stem or blossom end, the average time during July and August was 7 to 8 days from leaving the fruit to pupation, the minimum being 1 day and the maximum 12 days. The actual duration of the pupal stage varies from a minimum of probably 4 to a maximum of 17 days, averaging about 10 days. A technical description is given of the eggs, which, in rearing cages, were deposited on the upper surface of the fruit stems, etc.

A specimen of a parasite reared from a larva infesting the apple has been determined as *Phanerotoma* n. sp. It is stated that the usual treatment practiced against the codling moth has so far served to keep in check the serious injury by the lesser apple worm.

New species of Tingitidæ and description of a new Leptoglossus, O. Heidemann (*Bul. Buffalo Soc. Nat. Sci., 9 (1909), No. 2, pp. 231–238, figs. 6*).—Four species belonging to the genus Atheas, *Corythuca floridana* from Florida, and *Leptoglossus ashmeadi* also from Florida, are described as new.

A generic revision of American moths of the family Œcophoridæ, with descriptions of new species, A. Busck (*Proc. U. S. Nat. Mus., 35 (1909), pp. 187–207*).—The larvæ of the Œcophoridæ are said to have various life modes, though a majority either live in spun leaves or feed in decayed wood. One American genus is parasitic upon Kermes. A few of the species are of some economic importance as enemies of cultivated crops. Many of the species overwinter as adults in thatch or under bark, or as in the case of some Depressaria, in houses, thereby occasionally causing unnecessary alarm when they appear in numbers at the approach of warm weather.

Descriptions of new species of North American crambid moths, W. D. Kearfott (*Proc. U. S. Nat. Mus., 35 (1909), pp. 367–393, figs. 14*).—Twenty species representing 8 genera are described as new.

A revision of some species of Noctuidæ heretofore referred to the genus Homoptera boisduval, J. B. Smith (*Proc. U. S. Nat. Mus., 35 (1909), pp. 209–275, pls. 6*).—A table for their separation precedes the account of the species noted.

The genitalia of the group Noctuidæ of the Lepidoptera of the British Islands, F. N. Pierce (*Liverpool, 1909, pp. XII+88, pls. 32*).—This account of the morphology of the male clasping organs is said to record the results of 20 years' investigation made in odd hours. It is illustrated by many pen drawings.

The larch shoot moths (*Bd. Agr. and Fisheries [London]. Leaflet 208, pp. 4, figs. 3*).—An account is given of the tineid moths, *Argyresthia laevigatella* and *A. atmoriella*. In the neighborhood of Oxford and in Hampshire the larches up to 20 years of age are said to have been much injured by these pests.

Descriptions of some new mosquitoes from tropical America, H. G. Dyar and F. Knab (*Proc. U. S. Nat. Mus., 35 (1909), pp. 53–70*).—Thirty-one species, representing 7 genera, are described as new to science.

Mosquitoes at St. Vincent, W. N. Sands (*Agr. News [Barbados]. 8 (1909), No. 185, p. 170*).—A list is given of 12 species of mosquitoes known to occur on the island of St. Vincent. The larvæ of *Cellia (Anopheles) argyrotarsis* and the wild pine mosquito, *Wyeomyia* sp., were found breeding in abundance in water that had collected at the bases of leaves of the so-called wild pines, which are epiphytic bromeliads belonging to various species of Pitcairnia, Æchmea, and Tillandsia that occur in large numbers on various trees. Nearly every plant with water that was examined contained larvæ, even those brought down from a height of 30 to 40 ft.

New mosquitoes from the Sudan, F. V. Theobald (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 249–267, pl. 1, figs. 27*).—One genus (Mimeteculex), 6 species, and 1 variety are described as new to science.

Mosquito work, A. Balfour (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 64–67, figs. 2*).—An account of the mosquito investigations at Khartoum. It is said that while *Stegomyia fasciata* has occasionally reappeared it has never gained a footing in the town and the same is true of the anopheline, *Pyretophorus costalis*. Because of effective work, mosquitoes are rare in Khartoum, being as a rule represented by only one species, *Culex fatigans*.

Prof. Koebele's work on horn fly, R. C. L. Perkins (*Hawaii. Planters' Mo., 28 (1909), No. 4, pp. 122–125*).—This is a preliminary report on the introductions, from Germany, of parasites and other enemies of the horn fly now under way.

Warble flies (*Agr. News [Barbados], 8 (1909), No. 185, p. 170*).—Notes are given on the ox warble-fly, which is reported to have been found at St. Lucia, West Indies, in cattle that had been imported from Canada.

Sense of smell in flies, A. Hill (*Nature [London], 80 (1909), No. 2063, p. 308; Sci. Amer. Sup., 67 (1909), No. 1745, pp. 375, 376*).—The author has found formalin (40 per cent formaldehyde), 2 teaspoonfuls to a soup plate full of water, to be by far the most efficient of fly destroyers. The solution neither attracts nor repels the flies.

Sleeping sickness and the Bahr-El-Ghazal Province, H. Ensor and R. G. Archibald (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 93–99, maps 2*).—Information on the habits and distribution of *Glossina palpalis* and *G. morsitans* is included in this account.

Hylemyia coarctata, a destructive wheat pest, H. F. Fryer (*Ent. Mo. Mag., 2. ser., 20 (1909), No. 234, pp. 134, 135*).—The larvæ of this fly are said to have seriously injured young wheat in England by feeding in the stem. The damage caused seems to have been generally attributed to wireworms.

An illustrated glossary of chætotaxy and anatomical terms used in describing diptera, W. R. Walton (*Ent. News, 20 (1909), No. 7, pp. 307–319, pls. 3*).—A richly illustrated glossary of value to the economic entomologist in the identification of flies.

A monographic revision of the Coleoptera belonging to the Tenebrionide tribe Eleodiini inhabiting the United States, lower California, and adjacent islands, F. E. Blaisdell (*U. S. Nat. Mus. Bul. 63, pp. XI+524, pls. 13, figs. 8*).—The species of this tribe are considered under the four genera Trogloderus,

Embaphion, Eleodes, and Eleodimorpha, the last-named of which is new to science.

Species of the tribe rarely ascend plants, although the smaller species may be found on the stems or under the bark of shrubs. All are vegetable feeders, apparently preferring dried vegetation and fungi, although eating green plants. As far as has been determined they are neither injurious nor beneficial, appearing to prefer decaying vegetation to the living. They are abundant, both as to species and as to individuals, throughout the region west of the Mississippi River, from the northern boundary of the United States southward into lower California, Mexico, and South America.

Observations on the life history of the Tomicini on the land of the Moscow Agricultural Institute, N. MALOLIETENKOW (*Izv. Moscov. Selsk. Khoz. Inst.* [*Ann. Inst. Agron. Moscou*], *14* (*1908*), *No. 3, pp. 99–113, figs. 3*).—The species here considered are *Tomicus chalcographus*, *T. sexdentatus*, *T. laricis*, *Dryocoetes autographus*, and *Trypodendron lineatum*.

An outbreak of horse-radish leaf beetles, G. KORFF (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 6* (*1908*), *Nos. 8, pp. 92–95, figs. 2; 11, pp. 129–132*).—The injury caused by *Phædon cochleariæ* is here described and remedies therefor are discussed.

The biology of the garden snout beetles, J. SCHREINER (*Ztschr. Wiss. Insektenbiol., 5* (*1909*), *No. 1, pp. 6–14, figs. 10*).—Brief notes are given on the life history and habits of *Rhynchites auratus*, *R. bæchus*, and *R. giganteus*.

New breeding records of the coffee-bean weevil, E. S. TUCKER (*U. S. Dept. Agr., Bur. Ent. Bul. 64, pt. 7, pp. 61–64, pl. 1, fig. 1*).—The coffee-bean weevil (*Araecerus fasciculatus*) has been found by the author near Alexandria, La., breeding in dried cornstalks. From the evidence at hand it appears that the larvæ hatch within the living tissues of the plants. Holes made by the weevils in emerging furnish a retreat for cotton boll weevils which may enter and hibernate in the pith. The infestation appeared to be widespread. The weevil has also been bred from berries of the chinaberry (*Melia azedarach*) at Victoria, San Augustine, and Longview, Tex., and Monroe, La.

The parasite *Cerambycobius cushmani*, which is an important enemy of this weevil, is also highly inimical to the cotton boll weevil. *Eurytoma tylodermatis* and several undetermined parasites have also been bred from infested chinaberries. A new species of mite belonging to the genus Pediculoides, known as an enemy of boll weevil larvæ, was found at Monroe, La., attacking the larvæ.

Previously published records of the coffee-bean weevil are said to show it to be a common insect in warm climates and that it has no particular food preference.

The ant and her ways, K. ESCHERICH (*Sci. Amer. Sup., 67* (*1909*), *No. 1747, pp. 404–406, figs. 24*).—A popular and richly illustrated account of the habits of the ant.

The bembecid wasps of Boulder County, Colorado, S. A. ROHWER (*Univ. Colo. Studies, 6* (*1909*), *No. 3, pp. 243–248, figs. 8*).—Six species are listed.

A new chalcidoid of the Eulophid genus Aphelinus, parasitic on Schizoneura cratægi, A. A. GIRAULT (*Psyche, 16* (*1909*), *No. 2, pp. 29–31*).—Females, of *Aphelinus varicornis*, which is here described as new, were bred between November 16 and December 18, 1908, from viviparous forms collected on Cratægus, October 17, 1908, at Chicago, Ill.

The mustard sawfly (Athalia proxima), H. M. LEFROY (*Mem. Dept. Agr. India, Ent. Ser., 1* (*1908*), *No. 6, pp. 357–370, pl. 1*).—An account of the life history, habits, etc., of this pest, which attacks various varieties of Brassica, radish, etc., in India.

Notes on the Ixodoidea, IV, L. G. NEUMANN (*Arch. Par., 10 (1906), No. 2, pp. 195–219, figs. 17*).—Four species of Ixodes, 7 species of Amblyomma, and one species each of Rhipicephalus, Dermacentor, and Hæmaphysalis are described as new to science.

Notes on the Ixodoidea, V, L. G. NEUMANN (*Arch. Par., 11 (1907), No. 2, pp. 215–232, figs. 14*).—*Rhipicephalus lunulatus* and *R. supertritus*, both taken from the horse in Congo Free State, *Margaropus lounsburyi* from the horse and cattle in Cape Colony, and *Argas brumpti* from Central Africa are described as new to science.

Notes on the Ixodoidea, VI, L. G. NEUMANN (*Arch. Par., 12 (1908), No. 1, pp. 5–27, figs. 16*).—In this part two species of each of the genera Ixodes, Rhipicephalus, Amblyomma, and Ornithodoros, and one subspecies belonging to the genus Ixodes are described as new.

The tick pest, F. H. ROBERTSON (*Jour. Dept. Agr. West Aust., 18 (1909), No. 5, pp. 368–371, figs. 3*).—A brief account of the fowl tick which, though almost unknown in Western Australia 10 years ago, has now become very prevalent.

Insects and diseases of vegetables, M. T. COOK and W. T. HORNE (*Estac. Cent. Agron. Cuba Bul. 12, English Ed., pp. 28, pls. 8*).—This is a preliminary report on the insect pests and diseases of vegetables in Cuba.

There are said to be several species of crickets which do considerable damage, among the most troublesome being *Gryllodes poeyi*, which cuts twigs and leaves from small plants and frequently cuts the very young plants at the surface of the ground. In many cases entire crops are destroyed. The changa (*Scapteriscus didactylus*) does some damage by cutting young plants, while the bibijagua (*Atta insularis*) is a very troublesome ant. Plant lice are reported to have been abundant on many vegetables, such as turnips, radishes, beans, cabbages, cucumbers, etc. Thrips have caused considerable injury to a number of plants, particularly beans and onions.

The red spider has attacked eggplants, tomatoes, and other plants, while a species of Eriophyes attacks the tomato, causing a thickening of the stem and an excessive growth of plant hairs, resulting in a stunted plant. The cachazudo (*Feltia annexa*) is considered the worst enemy of tobacco. *Pieris monuste* has been specially destructive to rape and cabbage. *Plutella maculipennis* are abundant on cabbage and rape and cause considerable loss. *Protoparce carolina* feeds to some extent upon tomatoes, but not in sufficient numbers to do much injury. The larvæ of *Dilophonota ello* feed upon young yuca or cassava, and sometimes occur in sufficient numbers as to be injurious to the growing crop.

Pega-pega, the leaf folder (*Micromima olivia*) is specially destructive on tobacco in the seed bed, also attacks several vegetables, particularly tomatoes, and has been found on the eggplant and *Solanum torvum*. *Lincodes integra* was observed in December, 1904, feeding upon eggplants in the Matanzas province. The eggplant weevil (*Anthonomus varipes*) has been observed in the vicinity of the station, where it is apparently the worst enemy of the eggplant.

Of the bean insects, a small green leaf hopper is thought to be the most harmful. A species of Diabrotica and lepidopterous larvæ of several kinds are also injurious to beans. The larvæ of *Layocheinus obsoletus* have been found to some extent on the old canes of yuca and cassava, but apparently do not attack the plant until quite old, and do not cause a great amount of injury. Either the pasador of the tobacco, or a species very similar to it, caused some trouble by feeding upon the tubers of potatoes. The pasador of the eggplant (*Anthonomus* sp.), a stem borer of a different family, does some harm by shortening the productive life of the plants. The tetuan (*Cylas formicarius*) fre-

quently occurs in great numbers and causes much damage to the roots of the sweet potato.

The pickle worm (*Diaphania hyalinata*) is reported as causing considerable injury to cucumbers and pumpkins. It is parasitized to some extent by both dipterous and hymenopterous parasites. *Papilio polyxenes* has been observed at the station feeding on the parsnip. Nematodes have been found to cause some loss to tomatoes. The insects most injurious to stored seeds in Cuba are *Calandra oryzæ*, *Bruchus obtectus*, *Bruchus* sp., *Spermophagus pectoralis*, and a minute moth.

The cabbage and related plants suffer from a leaf and stem rot, which is evidently caused by *Bacterium campestris*. The leaf spot or blight (*Septoria lycopersici*) and the leaf mold (*Cladosporium fulvum*) have been found quite commonly on tomatoes. A bacterial tomato blight has been recognized in the sandy lands of Pinar del Rio, where it causes some loss. In the year 1906–7 there was a great deal of trouble in the Pinar del Rio vegetable districts from a rot which attacks fruit of the tomato at the blossom end. Complaints were received from the Güines district of a brown rot of green tomatoes, which appears to be due to a Rhizoctonia.

The diseases of eggplants here mentioned include leaf spot (*Phyllosticta hortorum*), a stem disease, a wilt disease, and scab. The diseases of peppers mentioned are a fungus disease of the roots, probably due to *Sclerotium* sp., and a fungus disease of the leaves (*Cercospora* sp.). Cucumbers, muskmelons, and watermelons suffer from a leaf blight or mildew (*Plasmopara cubensis*). Then bean diseases mentioned are pod rot caused by the fungus *Collectotrichum lindemuthianum* and a mildew (*Oïdium* sp.). Celery at the station during the winter of 1904–5 suffered a severe attack of leaf spot, caused by the fungus *Cercospora apii*. Okra is attacked by leaf spot, due to *Cercospora hibisci*. A number of complaints of scabby potatoes have been reported.

Remedies for the insect pests and diseases reported are briefly considered.

The insect and other allied pests of orchard, bush, and hothouse fruits, F. V. Theobald (*Wye, 1909, pp. XVI+550, figs. 328*).—This book is said to be written solely with the object of placing before fruit growers, gardeners, and amateurs an account of the insects, mites, and worms which attack and cause disease among fruit trees, bushes, etc., both in the open and under glass. The author considers in consecutive order the insects injurious to the apple, apricot, cherry, currants, damson, fig, gooseberry, loganberry, nuts, peach, pear, plum, pineapple, quince, raspberry, strawberry, and grape. Accounts of some insects which might become pests in the country owing to importation, beneficial insects, and washes and fumigants used in insecticides and acaricides, together with other data, are appended.

Poisoned bait for fruit fly, C. W. Mally (*Agr. Jour. Cape Good Hope, 34 (1909), No. 6, pp. 620–633, pl. 1, figs. 5*).—A practical test of the poisoned bait method for destroying the fruit fly, carried on from January to April, 1909, in continuation of work conducted during 1903–4, previously noted (E. S. R., 16, p. 991), indicated that the pest can be almost completely controlled under orchard conditions by means of a very light sprinkling of a poisoned sweet over the trees just before or during the ripening period of the fruit.

In the experiment reported, the formula sugar 2 lbs. and arsenate of lead 4 oz., dissolved in cold water 4 gal., was used. The bait was applied by means of a common brass garden syringe, using the finest, slightly convex rose, which broke the liquid up into innumerable small drops as it was forced over the trees, thus enabling it in descending to be evenly distributed in the form of

very small specks on the leaves. From 1 to 1½ pts. was sufficient to spray a good-sized 10-year old peach or nectarine tree.

The number of applications of the bait necessary to protect any given crop of fruit will vary according to local conditions and the season. By beginning when the early apricots and peaches are from one-fourth to one-half grown and distributing the bait carefully and evenly once every 10 days to 2 weeks in fine weather and immediately after each rain during the rainy periods the early broods of the fruit fly will be destroyed and thus prevent the maggots in the fruit, especially if reasonable care has been taken in collecting and destroying refuse fruit. If the early baiting is carefully done it should not be necessary to bait so persistently in the latter part of the season unless there is an outside source of infection.

"It is, therefore, evident that the treatment of stone fruits for the destruction of the fly is an important factor in protecting the apple crop from infection later in the season. The poison-bait method just described for stone fruits is equally applicable for citrus fruits. By a judicious distribution of the poisoned bait over the tree, hedges, vines, bushes, etc., in the yard for the destruction of the fruit fly, the house fly will also in all probability be destroyed to a large extent."

Experiments with arsenicals in combating the grapevine pyralid, H. MORSTATT (*Weinbau u. Weinhandel, 27 (1909), Nos. 12, p. 109; 13, pp. 119, 120*).—A brief account of the injury due to *Conchylis ambiguella*, and of experiments with arsenicals.

Spraying v. dusting, F. W. FAUROT (*Missouri Fruit Sta. Bul. 19, pp. 3–24, pls. 16*).—The results of comparative tests of commercial dust, homemade dust, and liquid sprays conducted by the author in cooperation with this Department in the vicinity of Anderson, Mo., are here reported.

Experiments upon Lansingburg apples reported in tabular form show that 93.8 per cent of the fruit on untreated trees the first of June dropped after that date and 80 per cent of the fruits that fell were wormy. From the selected trees in various dusted plats from 75 to 93 per cent of the fruit dropped, and from one-third to one-half of the dropped fruit was wormy, while from the sprayed plat only 31.2 per cent of the fruit dropped, of which but 7.2 per cent was wormy. Dust was found to be about intermediate in value between no treatment and spraying for controlling the codling moth. A plat that received 10 applications of commercial dust gave only 66 per cent of the fruit free from worms.

Dust was found to be entirely ineffective against bitter rot. A plat that received 13 applications of commercial dust gave only 2.3 per cent of the fruit free from bitter rot. Records of the merchantable fruits and culls at picking time from 5 trees treated with homemade dust, 30 trees treated with commercial dust, 70 sprayed trees, and 9 untreated trees, show a gain of from 83 to 85 per cent of merchantable fruit in favor of the sprayed plat over either the dusted or the untreated plats, while if only the fruits actually picked from the trees are considered the gain was about 95 per cent in favor of the sprayed plat.

Experiments with Black Twig apples show a difference as to apple scab of over 87 per cent in favor of the sprayed plat and emphasized the inefficiency and impracticability of dusting for the control of fungus diseases. Counts of merchantable fruit and culls showed a difference of over 56 per cent of merchantable fruit in favor of a sprayed plat when compared with dusted plats and of over 73 per cent when compared with an untreated plat.

Gano trees were sprayed under 200 lbs. pressure with Bordeaux nozzles and with vermoral nozzles with 1/10 in. openings in the caps, but after the mixture

dried a careful examination showed no difference in the filling of the calyx cavities. Where power sprayers are operated at high pressure it is considered that Bordeaux mixture made with 2 lbs. of bluestone and 3 lbs. of lime to 50 gal. of mixture is sufficiently strong for the two sprayings following the falling of the blossoms.

It is recommended that for the first application, Bordeaux mixture (5:5:50) or (4:4:50) be used after the cluster buds open but before blooming; that the second application be Bordeaux mixture (2:3:50) and an arsenical, applied just as soon as the bloom had fallen; that the third application be Bordeaux mixture (2:3:50), or self-boiled sulphur-lime, and an arsenical, applied 3 to 4 weeks after the petals fall; that the fourth application be Bordeaux mixture (4:4:50) and an arsenical, applied 6 or 7 weeks after the petals fall; that the fifth application be Bordeaux mixture (4:4:50) and an arsenical, applied 9 or 10 weeks after the blooming period; and that the sixth application be Bordeaux mixture (4:4:50) and an arsenical, applied about 3 weeks after the fifth application.

Concentrated lime sulphur: Its properties, preparation, and use, J. P. STEWART (*Pennsylvania Sta. Bul. 92, pp. 3–20, figs. 5*).—The advantages enumerated for this insecticide are cheapness and wide availability of materials; safety to the trees; simplicity of preparation; and substantial effectiveness if carefully made and thoroughly applied; while the disadvantages are extreme causticity and corrosion to flesh and machinery; large amounts of sediment of uncertain value; a demand for immediate application; inability to store the product, thus requiring extra labor at times when men are already rushed and often involving loss of materials; the need for heating excessive amounts of water; the lack of "creeping ability;" and the absence of a sure and convenient test for reliability of the finished spray. These imperfections having greatly limited the use of the wash, the author conducted an investigation in order to determine the essential features involved in the preparation of storable cencentrated solutions.

The problem of producing a storable lime-sulphur is one of preventing the crystal formation at ordinary temperatures and of securing a product sufficiently condensed to entitle it to storage space. Excess of lime and exposure to air were found to be important factors in the crystallization, whereas ordinary temperatures have little effect on the crystallization or keeping qualities of solutions.

The results of the experiments show that the way to avoid permanent crystal formation is to remove the lime in the ingredients, transfer the liquid to a storage vessel while still hot, and protect it from the air, either by oil films or complete filling of closed vessels.

The results obtained from the use of different ratios of sulphur to lime show that the optimum weight of sulphur for use with 100 gal. of water and 100 lbs. of lime ranges from 190 to 205 lbs. "The best concentration is evidently a matter of viewpoint. For the best utilization of materials and fair storage qualities, 112 to 120-gal. volumes are preferable. For better storage and fair utilization of materials, 75 to 80-gal. volumes may be best. For average qualities of both utilization and storage, 100 to 110-gal. volumes are best, as well as simplest, and are accordingly recommended in this bulletin for general conditions."

The details connected with the preparation and application of the wash including a table of times and strengths of spraying for various purposes are discussed at length.

Directions for the application of carbon disulphid in vineyard, orchard, garden, and farm, L. HILTNER (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser.,*

7 (1909), No. 4, pp. 45–53, figs. 3).—Directions are given for the use of this insecticide, including descriptions of the apparatus to be used. A knapsack injector is illustrated.

Spraying machinery, F. W. FAUROT (*Missouri Fruit Sta. Bul. 20, pp. 3–26, pls. 12*).—This discussion of spraying machinery is said to be based upon several years' observations, field experience in the operation of a number of makes of machines, and data obtained from mechanical tests relating to the efficiency, convenience, and suitability of certain accessories. The author does not recommend any particular make or enter into the detail of the mechanics of various machines but calls attention to those commendable or objectionable features which in general make machines desirable or undesirable for use under ordinary conditions.

The use of the Bengal bean in lime cultivations (*Agr. News. [Barbados], 8 (1909), No. 184, p. 154, fig. 1*).—The discovery is reported that certain trees which had been in a dying state for some time as a result of an attack by scale insects were much improved in general vigor and freedom from scales after the Bengal bean plant (*Mucuna pruriens*) had climbed over them and covered their branches for a year or two. From extended trials then made with the bean it is reported that good results always follow, and that the results are better the more completely the beans cover in all the trees. Up to the present time this has been tried only on limes that were badly infested with scale before the beans were planted. One field which received this treatment some 7 years ago, and has had no spraying or other treatment of a similar kind since, is remarkably healthy and free from scale. It is considered probable that the cover of beans maintains a more moist condition beneath and in this way encourages the growth of the fungi which attack and kill scale insects.

Animal parasites and diseases of the tea plant, C. BERNARD (*Bul. Dépt. Agr. Indes Néerland., 1909, No. 23, pp. 148, pls. 4*).—Part 1 of this work (pp. 1–39) is a general report of preliminary observations of the animal and vegetable parasites, including a bibliographical index.

In part 2 (pp. 41–148), the acarids which attack the plant, including the so-called red spider (*Tetranychus bioculatus*), scarlet mite (*Brevipalpus obovatus*), yellow mite (*Tarsonemus translucens*), five-ribbed tea mite (*Phytoptus carinatus*), and the pink mite (*P. theæ*), and the remedies therefor, are considered at some length. Next to the so-called mosquito blight due to species of Helopeltis, the red spider is said to be the worst pest of the tea plant that occurs in Java.

Pwê-nyet and Indian dammars, D. HOOPER (*Agr. Ledger, 1908–9, No. 3 (Veg. Prod. Ser., No. 108), pp. 31–50, fig. 1*).—This is a report on the quality of resins known as pwê-nyet, which are formed by bees, particularly *Melipona* (*Trigona*) *læviceps*, in building their nests.

Silkworms and how to rear them, Mrs. J. SOUTH (*Queensland Agr. Jour., 21 (1908), Nos. 3, pp. 135–142, figs. 9; 4, pp. 184–187, pl. 1, fig. 1; 5, pp. 226–228, pls. 3, figs. 1*).—A brief account, accompanied by illustrations of the apparatus used in rearing silkworms. Several species besides *Bombyx mori* including the tusser (*Antheræa mylitta*), muga (*A. assama*), and eri (*Attacus ricini*) are considered.

FOODS—HUMAN NUTRITION.

Food products, H. DUGAT and A. L. GIRARD (*Les Produits Alimentaires. Paris, 1908, pp. 378, figs. 148*).—This volume is made up of four independent publications bound together, the first dealing with animal products, the second with vegetable products, the third with beverages, and the fourth with sugars, coffee, and tea. The production and manufacture of these food products, their general characteristics, and other similar objects are considered.

Preliminary report of the dairy and food commissioner for the year 1908, J. FOUST (*Penn. Dept. Agr. Bul. 183, pp. 57*).—A summary is given of the work of the department, and statistics of a number of analyses of canned vegetables and fruits, dairy products, meats and fish, cakes, ice creams, flours, and other foodstuffs which were examined are discussed.

A list of creameries in Pennsylvania is also given, together with an article by W. Frear on the dairy industry in Pennsylvania, and a paper by C. H. LaWall and H. P. Cassidy on the trade in decayed eggs known as "rots" and "spots" and their employment in food products, in which a large amount of information is summarized regarding the handling and marketing of eggs, egg preservation, the uses of spoiled eggs by bakers, and the importance of restricting the use of such materials to technical purposes.

Report of the Department of Food and Drugs, State Board of Health, for June, 1909, H. E. BARNARD (*Mo. Bul. Ind. Bd. Health, 12 (1909), No. 6, pp. 78–82*).—Of 142 samples of canned goods, ice cream, milk, and beverages examined 46 were found to be illegal.

Report of the Department of Food and Drugs, State Board of Health, for July, 1909, H. E. BARNARD (*Mo. Bul. Ind. Bd. Health, 12 (1909), No. 7, pp. 90–94*).—Of 312 samples of sausage, meat, dairy products, baking powders, beer, and other materials examined 189 were declared illegal.

Information is also given regarding the inspection work in groceries, markets, canning factories, flour mills, milk depots, etc., and regarding the prosecutions brought under the state law.

Bacon curing in Scotland, L. M. DOUGLAS (*Trans. Highland and Agr. Soc. Scot., 5. ser., 21 (1909), pp. 58–74, figs. 7*).—A general and statistical article on the Scotch bacon industry in comparison with bacon production in Ireland.

Electric process of curing meat (*Pure Products, 5 (1909), No. 8, pp. 401, 402*).—A recently devised process is described in which meat is placed in pickle in vats which have systems of electrodes at each end, forming poles from which an electric current passes through the brine and meat, alternating from pole to pole. It is claimed that the meat cures much more rapidly than by the usual process.

Remarks on the electric process of curing meat, O. W. WILLCOX (*Pure Products, 5 (1909), No. 8, p. 402*).—The author discusses critically the electric process of curing meat noted above and its possible relation to the pure food laws. In his opinion the sodium chlorid is dissociated by the electric current and recombined in the meat, forming sodium hypochlorite. "Viewing the process simply from the known facts of electrolysis, the electric meat-curing process appears as a process of bringing the meat into contact with a solution of a pretty strong antiseptic."

Observations on an outbreak of meat poisoning at Limerick, E. J. MCWEENEY (*Brit. Med. Jour., 1909, No. 2524, pp. 1171–1173*).—A disastrous outbreak of food poisoning, with a number of deaths, was traced to the eating of warmed over meat and was caused, according to the author's conclusion, partly by bacterial intoxication and partly by infection, the causal micro-organism being *Bacillus enteritidis*. It seems probable that the animal was sickly and harbored the bacillus at the time of slaughter.

"The practical lesson to be derived from the observation of this occurrence is twofold. First, it indicates the need there is for the abolition of the private slaughterhouse and [the need] for the inspection of all animals used for human food, both before, during, and after slaughter; secondly, it emphasizes the danger arising from the use of old scraps of meat, and especially of beef. If, on economic grounds, such left-over pieces must be used up, the only way of avoiding or diminishing the danger would seem to be very thorough and prolonged boiling.

ordinary examination of such meat may fail to discover any grounds for suspicion."

Dried eggs and dried milk (*Pure Products, 2 (1907), No. 8, pp. 465–471*).—Methods of manufacturing dried eggs and dried milk are described.

Soups in tablet form (*Pure Products, 3 (1909), No. 9, p. 427*).—A process of making condensed soup in the form of tablets is described. In the example cited fat, onions, meat extract, rice, farina, and salt are used.

The chemical composition of soup tablets, H. WAGNER and J. CLEMENT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 5, pp. 314–319*).—Analyses of a large number of commercial soup tablets, chiefly of German manufacture, are reported.

Absence of purin bases in caviar, K. LENNER (*Biochem. Ztschr., 18 (1909), No. 3–5, pp. 380, 381*).—From analysis the conclusion is reached that caviar contains neither purin bases nor true nucleic acid.

Phosphate in foods (*Dept. Agr. Mysore, Ann. Rpt. Agr. Chem., 3 (1907–'8), pp. 21, 22*).—The author reports 0.35 per cent phosphoric acid in rice, 0.69 per cent in ragi (*Eleusine coracana*), and 1.02 per cent in oatmeal. The experimental data, in the author's opinion, did not substantiate the popular idea entertained locally that ragi is not so good a food as rice on account of a deficiency in phosphorus.

Some African food grains (*Bul. Imp. Inst., 7 (1909), No. 2, pp. 145–154*).—Information is given regarding the commercial value of food grains received from South Africa and analyses are reported of gray millet, "Tamba" millet, "Bolu" grain (*Eleusine coracana*), "Bambarra" groundnuts, and seeds of *Hibiscus sabdariffa*.

Milling and baking qualities of some Sudan wheats, A. E. HUMPHRIES (*Millers' Gaz., 33 (1909), No. 17, pp. 208, 209*).—Tests with 6 samples of wheat are reported. Variety names were not given, but the sample which was decidedly superior to the others was, in the author's opinion, similar to the variety known in India as Muzaffernagar.

Notes on the aforementioned wheats, R. HEWISON (*Millers' Gaz., 33 (1909), No. 17, pp. 209, 210*).—Brief statements are made regarding the source of the wheats included in the investigation referred to above.

Flour testing for the baker, R. HARCOURT (*Pure Products, 5 (1909), No. 8, pp. 305–308*).—A discussion of the subject with citation of some of the Canadian work.

"Any information which a baker can get regarding the peculiarities of the flour he is buying ought to be of considerable value. As has been shown, no chemical analyses will bring out the desired point, but simple baking tests made by an experienced person with the proper appliances will enable a baker to purchase flour intelligently and handle it to the best advantage in the bakery."

The behavior of wheaten flour toward bakers' and brewers' yeast, J. L. BAKER and H. F. E. HULTON (*Jour. Soc. Chem. Indus., 28 (1909), No. 14, pp. 778–781*).—An experimental explanation was sought for the fact that brewers' yeast, when used in bread making, does not produce a degree of fermentation commensurate with that produced by distillers' yeast.

When comparative tests were made with both brewers' and bakers' yeast and wheat flour, using distilled water as a menstruum, practically no fermentation took place in the case of the brewers' yeast, while distillers' yeast fermented well. When tap water was employed, however, the brewers' yeast fermented without any trouble.

Experiments were then conducted with inorganic salts, potassium sulphate and others, in distilled water. Here it was found that fermentation had taken place with brewers' yeast and that these salts had a sort of protective or anti-

toxic effect toward the toxins contained in the wheat flour. The use of these salts produced no acceleration of fermentation with bakers' or distillers' yeast. The effect produced by tap water is probably brought about by the presence of acid calcium carbonate. Brewers' yeast cultivated three times in distillers' mash took on some of the characteristics of bakers' yeast.

The explanation, therefore, is that the yeast cells acquire a sort of immunity to the toxin of the raw cereals. It is thus obvious why brewers' yeast does not give entire satisfaction when used with raw flours. It can be employed for bread making, however, by cultivating it several times in distillers' or raw worts, and thus acquiring a certain degree of immunity, or substances like potassium sulphate may be used to protect the organisms from the cereal toxin.

The toxicity of flours toward top fermentation of yeasts (Saccharomyces cerevisiæ), J. L. Baker and H. F. E. Hulton (*Jour. Soc. Chem. Indus., 28 (1909), No. 14, pp. 781–784*).—This is a continuation of the work on wheat flours noted above. Fermentations were carried out with invert sugar, aqueous flour extract, invert sugar and flour, aqueous flour extract and flour, distillers' wort (rye and maize), cold aqueous extract of distillers' malt, and unboiled malt wort prepared from brewers' malt.

It was found that potassium sulphate was without effect as far as the actual acceleration of fermentation was concerned with invert sugar solutions, and that its function is only that of a protective agent against toxins. A distilled water extract of the toxin is destructive to yeast and this toxicity can be held in check by the addition of potassium sulphate. The fermentation of a sugar solution by brewers' yeast is stopped by adding flour, but if potassium sulphate is present the fermentation proceeds. Brewers' yeast is acted upon strongly by the rye flour toxin, but the latter is not so soluble as the toxin of wheat. Fermenting an aqueous solution of flour by brewers' yeast and adding flour checks the fermentation. Bakers' yeast fermentations are not affected. A malt distillers' wort containing rye flour and maize is toxic to brewers' yeast, but this toxicity can be destroyed by boiling. High kilning temperatures destroy the toxicity of the malt but the process of germination does not. The toxicity in the flour may also be partially destroyed by heating at a temperature of 100° C. for some hours. The author sought to simulate the toxic action of the flour toxin by adding potassium cyanid to the fermentation, but found that potassium sulphate exerted no protective effect.

Breakfast foods, R. Harcourt (*Pure Products, 5 (1909), No. 9, pp. 551–555*).—This discussion of the nutritive value and place in the diet of cereal breakfast foods is based on the author's investigations (E. S. R., 19, p. 683).

Examination of some of the diabetic foods of commerce, D. W. Fetterolf (*Univ. Penn. Med. Bul., 22 (1909), No. 7, pp. 217–222*).—Analyses of a number of sorts of gluten flours manufactured in the United States and of foreign diabetic products are reported in comparison with wheat flour. The amount of carbohydrates in both classes of diabetic goods varied within wide limits.

An analysis is also reported of peanuts and of a raspberry jelly which has been put on the market for diabetics. The latter proved to be "a wholly artificial product, composed of apple juice, glycerin, anilin coloring, and flavored with artificial raspberry flavor. The origin of this spurious product is unknown."

Infant's and invalid's foods, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 185, pp. 15*).—In this report are included the results of the examination of 77 samples of so-called infant's and invalid's foods. The author calls attention to the fact that these goods fall naturally into two classes which are distinguished by the amount of unchanged starch present. One group containing about 75 per cent of unchanged starch may be designated as farinaceous foods, while the remainder contain smaller amounts, some showing little or no starch.

"Most of those foods which are poor in fat are directed to be prepared for use by addition of milk.

"It must be said that some of those directed to be prepared with water only would seem to provide a starvation diet for infants, so far as the fat is concerned; but questions of this kind must be left to be decided by physicians."

The molecular weight of the dextrin of honey from Coniferæ, H. Barschall (*Arb. K. Gsndhtsamt., 28 (1908), No. 2, pp. 405–419, fig. 1*).—The molecular weight ranged in 5 samples from 456 to 485.

Fruit juices, R. O. Brooks (*Pure Products, 5 (1909), No. 9, pp. 455–459*).—Average analyses of apple, grape, lime, pineapple, strawberry, and other fruit juices are presented, and the manufacture of fruit juices, especially on a commercial scale, is discussed.

Cherry juice, P. Buttenberg and P. Berg (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 11, pp. 672, 673*).—A number of analyses are reported.

Concerning the uncooked juice from different sorts of strawberries, J. Kochs (*Pharm. Zentralhalle, 50 (1909), No. 28, pp. 585–587*).—Analyses are reported of the juice of 30 varieties of strawberries. The berries ranged in weight from 0.9 to 16.2 gm. each.

Wine musts of the year 1908 from the Moselle and neighboring localities, A. Wellenstein (*Ztschr. Untersuch. Nahr. u. Genussmtl., 18 (1909), No. 4, pp. 271–275*).—A large number of analyses are reported.

Temperance beers, H. E. Barnard (*Mo. Bul. Ind. Bd. Health, 12 (1909), No. 7, pp. 95, 96*).—The general character of so-called temperance beers is discussed in comparison with ordinary beer, and 46 analyses are reported.

Cocoa and chocolate, E. Luhmann (*Kakao und Schokolade. Hanover, 1909, pp. 210, figs. 68; rev. in Pure Products, 5 (1909), No. 8, p. 439*).—It has been the author's purpose in this volume to give an extended description of the preparation of all kinds of cacao preparations and the apparatus necessary in this industry.

"Malt coffee," L. Eberlein (*Pure Products, 5 (1909), No. 9, pp. 459, 460*).—The process of manufacturing so-called malt coffee from kiln malt, either wet or dry, is described.

Tea, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 183, pp. 18*).—The total number of samples examined was 222. The results showed that 31 black teas and 19 green teas were below standard in extractives. Two samples yielded more than 8 per cent ash.

For this investigation only the cheaper grades of tea were secured. "With very few exceptions, the teas . . . are retailed at from 15 to 30 cts. per pound. They may therefore be regarded as representing the lower qualities of this article. Most samples consist of large, coarse leaves, very much broken, and have a large proportion of leafstalks and bits of stem. The delicate aroma of good tea is notably absent, on infusing; but the teas are botanically true to name, and no admixture of foreign leaves occurs."

Ground ginger, A. McGill (*Lab. Inland Rev. Dept. Canada Bul. 184, pp. 19*).—Of 150 samples examined 65 per cent were declared genuine, 21 per cent adulterated, and 14 per cent doubtful.

Commercial cream of tartar, A. Lemoine (*Lab. Inland Rev. Dept. Canada Bul. 180, pp. 23*).—The total number of samples examined was 225, of which 180 were genuine, 41 adulterated, and 4 doubtful.

The manufacture of sugar color, W. Hoffman (*Pure Products, 5 (1909), No. 9, pp. 476–478*).—A commercial method followed in the manufacture of sugar color from cane sugar or from glucose is described. This material is marketed either in liquid or solid form. The author states that pulverized sugar color,

generally mixed with a little fat, is used in the coffee industry under the name "coffee essence."

"Beer colored with sugar color may be recognized by the fact that the foam is not a beautiful white, but has a yellow color."

The fuels of the household, MARIAN WHITE (*Boston, 1909, pp. 97*).—The composition of fuels, combustion, ignition, and incandescence, the solid fuels, the semisolid fuels, liquid and gaseous fuels, economy of fuels, and the use of electricity for light and heat are some of the questions discussed. This volume summarizes a large amount of data on the subject with special reference to household problems. An index is provided.

Cooking for two, JANET M. HILL (*Boston, 1909, pp. XII+407, pl. 4, figs. 105, dgms. 3*).—A large number of recipes are given for the preparation of foods in small quantities, the problems of housekeeping are discussed from this standpoint, and sample menus are given for a family of two for a week in each month of the year.

The gist of domestic science, ELIZABETH GIST (*Albert Lea, Minn., 1909, rev. ed., pp. 168*).—The author has summarized a large number of recipes for the preparation of food and in addition briefly discusses some general household topics.

Food values. Practical methods in diet calculations (*Bul. Amer. School Home Econ., Ser. 1, 1909, No. 13, pl. 1, figs. 13*).—Data are summarized in tabular form which show the nutritive value of a large variety of foods reduced to the uniform basis of portions supplying 100 calories, and also on the basis of composition and energy value per ounce, the former table being compiled from I. Fisher's work (E. S. R., 17, p. 1174), and the latter from publications by J. H. Kellogg. Fisher's graphic method of calculating dietaries (E. S. R., 18, p. 1152) is also explained.

Note on the social condition of certain working class families in Dublin, C. D. LA TOUCHE and T. J. STAFFORD (*Dublin: Govt., 1907, pp. 45*).—Data were collected regarding living expenses, food consumption, etc., of 21 workingmen's families in Dublin.

The protein content in these studies ranged in round numbers from 45 gm. to 154 gm. per man per day, the energy value in these 2 cases being 2,058 and 3,927 calories, respectively. In a few cases the energy value was higher than the latter figure, while in 10 cases it was less than 3,000 calories. In the case of 10 of the families representing unskilled laborers the average protein consumption was in round numbers 81 gm. and the energy 2,649 calories per man per day. The total weekly income of the unskilled laborers was on an average $3.99. In the case of all the families studied the average income from all sources was $5.62.

The sociological and economic aspects of the data collected are discussed and suggestions are made for improvement of the diet.

In the opinion of the authors, under the conditions studied, there is no margin for a family of 5 with an income of $5 a week.

"In view of the large proportion of income devoted to food, the nutritive qualities of the food are all-important. It is, therefore, advisable to attack the question of protein and fuel value sufficiency both from the empirical and from the scientific standpoint, (a) by collecting budgets on the same lines as in the present instance for representative families in the British Isles, both in town and country districts, as well as in foreign countries, in the most extended manner possible; (b) by showing from the statistics so obtained the maximum, minimum, and average protein and calories actually consumed per head over a very wide area, and under a great diversity of conditions, and on the basis of the phenomena observed proceeding with a scientific investigation of the quan-

tity of protein and calories needed for physical efficiency under varying circumstances of age, sex, occupation, season, and climate; (c) by educating the laboring classes, as the results of conclusions reached, as to how their living might be improved by a more economical and effective application of their expenditure on food."

Cost of living [in the district of Frankfort], F. OPPENHEIMER (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1909, No. 4325, pp. 14–34*).—A considerable amount of statistical data is summarized regarding the cost of food and other household necessities, the consumption of meat, and similar topics.

Labor, wages, and cost of living [Moscow], H. M. GROVE (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1909, No. 4323, pp. 20–24*).—Some data are included regarding the cost of important foodstuffs in different years.

Food requirements in the Tropics and in Europe, GLOGNER (*Arch. Schiffs u. Tropen Hyg., 13 (1909), No. 6; abs. in Biochem. Zentbl., 8 (1909), No. 13–16, p. 695*).—In the Tropics the author weighed 71 kg. and required 2,118 calories or 29.8 calories per kilogram for maintenance. After 5 years residence in Europe he required only 25.4 calories per kilogram and increased in weight.

The amount of water consumed per day in the Tropics was greater than in Europe by 353 cc.

The influence of meteorological and climatic conditions on metabolism, J. B. NICHOLS (*Med. Rec. [N. Y.], 76 (1909), No. 12, pp. 471, 472*).—On the basis of data which he has collected and summarized the author discusses the regulation of body temperature, and the effects of heat and humidity of the atmosphere and other conditions on food requirements, muscular work, and other body conditions. A generous diet he considers is required in cold weather or cold climates to make up for the greater loss of heat. "There is no necessity for an increase of nitrogenous food in the cold, as energy yield only is needed, for which purpose fat and carbohydrate admirably serve. . . .

"In hot humid weather it is especially important for the individual's comfort and safety that heat elimination be adequate. Heat production should be reduced to a minimum, as by avoiding muscular activity. The diet is not the greatest factor affecting the amount of body oxidation, as any excess of food not required to be burned up to provide for the body activities is stored up in the body. However, excess of food does to some degree increase body oxidation, carbohydrate least, and protein much the most. Hence is indicated rather spare diet in hot weather, especially of nitrogenous food. However, in obese persons a spare protein diet might be of advantage, through its effect in diminishing the store of body fat and so improving the conditions for heat dissipation."

The digestion and absorption of protein, K. VON KÖRÖSY (*Zentbl. Physiol., 23 (1909), No. 7, pp. 205–208*).—The absorption of protein and protein constituents in different parts of the digestive tract was studied, using egg albumen, gliadin, glycocol, and leucin.

Larger amounts of several amino-acids were absorbed in passing from the small intestine to 100 cm. of the cæcum than was the case with the mixed cleavage products, the difference between the lower and the higher cleavage products being especially marked. As the author points out, the experimental data reported did not prove that protein is hydrolized to amino-acids and absorbed in this form, though they render such a supposition probable.

The fate in the animal body of the benzol ring of protein which is not hydrolized. Phenazeturic acid as an important constituent of urine, H. VASILIU (*Hitt. Landw. Inst. Breslau, 4 (1909), No. 5, pp. 703–714*).—Investigations are reported in continuation of earlier work (E. S. R., 18, p. 863).

According to the author's conclusions, protein contains 4 or 5 per cent (estimated as hippuric acid) of a benzol constituent which is not hydrolized. In the case of carnivorous animals the benzol ring is largely destroyed, while in the case of herbivorous animals this is not the case, two-fifths appearing in the urine as hippuric acid and three-fifths as phenazeturic acid. Accordingly, the author concludes that this portion of the proteid molecule is 4 or 5 per cent less valuable for herbivorous than for carnivorous animals. Phenazeturic acid he regards as almost as important a constituent of the urine of herbivorous animals as hippuric acid.

Quantitative investigations in regard to the elimination of protein acids by the urine, W. Garinski (*Bul. Internat. Acad. Sci. Cracovie, Cl. Sci. Math. et Nat., 1909, No. 9, pp. 851–853; abs. in Chem. Ztg., 33 (1909), No. 73, Repert., p. 317*).—This is a study of the amount of protein acids which are discharged under normal physiological conditions, and of a few cases of the eliminations under pathological conditions.

The digestion of fat in the animal body, S. J. Levites (*Biochem. Ztschr., 20 (1909), No. 3–5, pp. 220–223*).—Using egg-yoke fat, olive oil, and other fats, experiments were made with dogs from which the author concludes that when fat is fed either alone or mixed with other foodstuffs only a very small quantity is saponified in the stomach.

The absorption of fat stained with Sudan III, L. B. Mendel (*Amer. Jour. Physiol., 24 (1909), No. 5, pp. 493–496*).—From his experimental data the author concludes that "when fat stained with water-insoluble dyes, like Sudan III, is fed, the pigments readily pass into the lymphatic vessels and thereby reach the blood stream. Since these compounds are soluble in free fatty acids as well as in neutral fats, their presence in the lypmh can not be taken as evidence either for or against the possibility of the digestion of fats prior to their absorption."

The excretion of sulphurous acid by a man in experiments with sodium sulphite and with sulphurous acid combined with sodium salts, F. Franz and G. Sonntag (*Arb. K. Gsndhtsamt., 28 (1908), No. 1, pp. 225–260*).—The occurrence of volatile sulphur compounds in urine distillates is not to be regarded as proof of the presence of sulphurous acid since acidulated human urine under normal conditions yields such compounds, the nature of which is in part unknown. Since the normal amount of these compounds can not be definitely determined, it is necessary in estimating sulphurous acid in urine to calculate the amount of such volatile bodies and also to make sure that the sample shows the presence of sulphurous acid. In the case of man as with animals (dogs) the greater part of the sulphurous acid taken into the stomach is recoverable as sulphate. By exercising great care and testing at intervals of 10 or 15 minutes, sulphurous acid may be detected in the urine, but in no case in quantity greater than 1 per cent of the total amount taken.

The results obtained in the experiments on the excretion of sulphurous acid when taken in the form of salts are in accord as regards physical-chemical relations with those secured from pure aqueous and acid solutions.

The effect of age and size upon the respiratory exchange of infants, A. Schlossmann and H. Murchhauser (*Biochem. Ztschr., 18 (1909), No. 6, pp. 499–505*).—From tests with an infant at different times it appeared that the carbon dioxid excretion and oxygen consumption per square meter of surface area did not vary with increasing age, and that in reality metabolic changes are proportional to surface area.

An apparatus for studying the respiratory exchange, F. G. Benedict (*Amer. Jour. Physiol., 24 (1909), No. 3, pp. 345–374, figs. 6*).—The principle used in the respiration calorimeter experiments for measuring respiratory fac-

tors has been adapted by the author to respiration experiments of short duration in which the respiratory quotient is measured. This form of apparatus is portable and a respiration chamber is not required.

The apparatus is so arranged that the subject breathes through nose pieces connected with three-way valves. A continuous air current is maintained by means of a blower. Carbon dioxid and water are removed from the expired air by means of soda lime and sulphuric acid, and oxygen is added to the air before it enters the lungs, the apparatus being of the so-called closed-circuit type.

Check experiments in which ether was burned and comparative experiments with the respiration calorimeter indicate that the method is accurate.

The Boston respiration calorimeter, W. FALTA (*Wiener Klin. Wchnschr., 22 (1909), No. 16; abs. in Biochem. Centbl., 8 (1909), No. 17–18, pp. 775, 776*).—A descriptive article with results of experiments on diabetic patients conducted by the author and by F. G. Benedict.

ANIMAL PRODUCTION.

Further investigations on the utilization of nonproteid nitrogen compounds in feeding stuffs, A. MORGEN, C. BEGER, and F. WESTHAUSSER (*Landw. Vers. Stat., 71 (1909), No. 1–3, pp. 1–170*).—These experiments were carried out on a plan similar to those previously reported (E. S. R., 20, p. 975), in which a portion of the protein in the ration fed to milch sheep and goats was replaced by amid extracts of malt sprouts, carbohydrates, asparagin, and ammonium acetate.

Additional substitutes used in the later experiments included amid extracts from grass and from beets, ammonium tartrate, and ammonium phosphate. The basal rations consisted of hay, beet chips, straw, gluten, starch, meal, sugar, and peanuts. During the protein period about 2.33 kg. of crude protein was fed per 1,000 kg. live weight, of which about 3 per cent was nonproteid. In the amid periods the nonproteid nitrogen varied from 28 to 44 per cent of the crude protein. In the carbohydrate period the crude protein was 1.533 kg., but the amount of pure protein was the same as in the amid period. For the study of milk production 13 sheep and 8 goats, and for the study of digestibility 6 wethers, 7 milch sheep, and 2 milch goats, were used as experimental animals.

The effects of protein substitutes on the yield of milk were similar to those previously obtained, as shown by the following table:

Average yields of milk and milk solids and percentage of milk fat with different protein substitutes as compared with the yields and fat percentage on a protein ration.

Number of animals.	Kind of animal.	Ration substituted.	Yield of milk.	Yield of dry matter.	Yield of nitrogen.	Yield of fat.	Relative percentage of fat.
			Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
6	Sheep	Ammonium acetate in the food	91.5	88.8	85.2	88.2	95.6
2	...do	Ammonium acetate in the drink	93.7	90.8	86.3	91.0	95.7
1	...do	Ammonium tartrate	80.8	70.5	73.3	61.7	76.4
2	...do	Asparagin	86.9	80.5	79.0	74.0	83.9
7	...do	Amid extract of malt sprouts	78.5	73.6	73.4	69.7	88.9
1	...do	Amid extract of grass	81.1	76.7	69.6	78.0	96.3
2	...do	Amid extract of beets	69.0	72.8	65.6	83.5	121.3
2	...do	Carbohydrates	76.3	73.7	71.7	72.5	94.3
1	...do	No substitute	77.5	73.6	73.0	67.6	88.0
3	Goats	Ammonium acetate	91.2	91.7	89.6	97.1	107.1
1	...do	Ammonium phosphate	96.1	86.0	89.0	76.6	80.6
1	...do	Amid extract of malt sprouts	90.1	86.2	86.4	80.9	89.4
6	...do	Amid extract of grass	77.5	81.0	73.2	98.2	127.2
1	...do	Amid extract of beets	81.3	83.7	77.6	97.1	119.7
4	...do	Carbohydrates	97.6	93.3	92.4	91.1	92.9

The different rations did not perceptibly affect the live weights of the animals nor the character of the milk fat, as shown by the refractometer.

The accompanying table of coefficients of digestibility are the average results obtained with 7 milch sheep and 2 milch goats:

Average coefficients of digestibility of rations containing protein and protein substitutes.

Rations.	Dry matter.	Crude protein nitrogen.	Pure protein nitrogen.	Corrected crude protein nitrogen.[a]	Corrected pure protein nitrogen.[a]	Fat.	Nitrogen-free extract.	Crude fiber.	Ash.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Protein	67.5	63.2	66.2	84.1	83.6	81.8	80.1	48.2	37.4
Ammonium salts and asparagin	66.3	63.3	50.6	84.2	75.5	80.8	78.8	43.4	36.2
Amid extract from malt sprouts	63.7	42.6	27.2	79.1	67.5	80.1	78.2	44.9	28.8
Amid extract from beets	69.2	53.5	47.5	76.5	69.8	86.1	77.1	56.8	57.7
Amid extract from grass	55.7	43.0	33.3	70.7	62.2	83.3	66.6	33.3	47.0
Carbohydrates	65.9	44.9	47.9	77.8	76.9	82.9	79.0	43.0	39.7

[a] Corrected digestibility obtained by pepsin-hydrochloric acid method.

In the experiment with 6 wethers, an addition of gluten to a ration of malt-sprout extract and straw increased the digestibility of the crude protein and decreased the amount of protein in the feces.

The entire series of experiments showed that a partial substitution of a nonprotein for a protein ration increased the amount of protein in the feces, but it is still undetermined whether or not a portion of this protein is formed from the nonprotein of the feed by means of bacteria. The amount of metabolic products is increased by coarse feeds, which irritate the alimentary tract, straw having more influence in this respect than hay. With a normal amount of coarse fodder this effect is fairly constant, but in these experiments the metabolic products amounted on an average to 0.56 gm. of nitrogen per 100 gm. of digested organic dry matter.

On the substitution of amids for protein, W. Thaer (*Landw. Vers. Stat., 70 (1909), No. 5–6, pp. 413–444, fig. 1; abs. in Chem. Zentbl., 1909, II, No. 4, pp. 305, 306*).—This experiment was a repetition of that reported by Friedlaender (E. S. R., 20, p. 70), except that growing wethers were used instead of full-grown sheep. The results obtained were similar to those of the previous experiment. The gain in body nitrogen was dependent entirely upon the protein and starch value, and is represented graphically in the form of a parabola.

The nutritive value of grape marc, J. Fabre (*Prog. Agr. et Vit. (Ed. l'Est-Centre), 30 (1909), No. 38, pp. 362–368*).—In experiments with a horse for 5 days, on a ration consisting exclusively of grape marc, the coefficients of digestibility were for dry matter 28.5, crude protein 21.5, fat 50.4, nitrogen-free extract 34.5, crude cellulose 20.3, and ash 29.0 per cent. The coefficients of digestibility of a similar experiment with a sheep lasting 4 days were dry matter 32.6, crude protein 15.9, fat 49.3, nitrogen-free extract 36.9, crude cellulose 26.4, and ash 50.1 per cent. These experiments indicate that grape marc is worth about one-third as much as grass as a feed, though practical feeders have thought it to be worth about one-half as much.

Sawdust and gypsum as food for cattle (*Agr. Gaz. N. S. Wales, 20 (1909), No. 3, p. 251*).—It is reported that in England mixtures of sawdust and gyp-

sum have been sold as by-products of cereals. The sawdust is finely ground and mixed with gypsum to give it the appearance of having flour attaching to it.

Some new feeding stuffs and their relative values as cattle foods, A. SMETHAM (*Roy. Lancashire Agr. Soc. Jour. 1909, pp. 28–45*).—Analyses are reported of soy-bean cake and meal, cotton-seed cake from China, Burma, and West Africa, Japanese linseed cake and meal, Chinese rape-seed cake and meal, Burma ground nut cake, Java beans, Indian dari, Guinea corn meal, lentils, locust beans, coconut cake, copra cake, palm kernel meal, candle nut cake, Para rubber nuts, tallow nuts, canary-seed cake, poppy-seed cake, peat dust, hemp-seed cake, and other feeding stuffs.

Registered feeding stuffs (*Kansas Sta. Feeding Stuffs Buls. 1, pp. 4; 2, pp. 4; 3, pp. 4*).—These bulletins contain the names of all feeds registered in the State of Kansas for the year ending June 30, 1910, and a list of manufacturers residing outside the State who have in previous years registered, but who have not renewed their registration since July 1, 1909. They are the first of a series of bulletins to be published monthly and to contain matters of interest to the consumer and to the trade in concentrated feeding stuffs.

Concentrated commercial feeding stuffs, F. W. ROBISON (*Mich. State Dairy and Food Dept. Bul. 161–163, pp. 16–30*).—Analyses are reported of linseed and cotton-seed meals, gluten feed, tankage, blood meal, pea and oat brans, and chicken, molasses, and mixed feeds. The bulletin also contains extracts from the Michigan feeding-stuffs laws.

Inspection and analyses of commercial feeding stuffs, W. F. HAND ET AL. (*Mississippi Sta. Bul. 123, pp. 3–61*).—This bulletin contains the text of the feeding-stuff law, with comments thereon, besides general information on the composition, value, adulteration, and use of commercial feeding stuffs, and other data. Analyses are reported of rice bran and polish, wheat bran, middlings, and shorts, corn chops, and proprietary and mixed feeds.

Analyses of commercial feeding stuffs, B. L. HARTWELL, J. F. MORGAN, and L. F. WHIPPLE (*Rhode Island Sta. Bul. 134, pp. 79–98*).—Analyses are reported of animal meal and beef scraps, cotton and linseed meals, gluten feed, malt sprouts and brewers' grains, wheat bran and middlings, mixed and proprietary feeds, provender and chop feeds, corn, oat, hominy and alfalfa meals, buckwheat feed, dried beet pulp, and red dog flour.

Foodstuffs and their deterioration, H. GAMBLE (*Vet. Jour., 65 (1909), No. 411, pp. 439–452, fig. 1*).—These are notes on the deterioration of feeds due to bacteria, fungi, animal parasites, and other causes. Experiments are reported on growing pure cultures of bacteria and molds found in linseed cake, cotton cake, and maize.

Abstracts of feeding experiments, B. L. HARTWELL (*Rhode Island Sta. Bul. 134, pp. 65–78*).—This is a continuation of the popular summary of recent feeding experiments, previously noted (E. S. R., 20, p. 567).

Experiments in feeding beef steers, J. A. MCLEAN (*Mississippi Sta. Bul. 121, pp. 12*).—The objects sought in undertaking these experiments were to determine (1) the feeding value of cotton-seed meal and hulls combined, when fed (a) to 2-year old cattle, (b) to 1-year old cattle; (2) what amounts are most desirable for daily rations; and (3) the profitableness of making beef on meal and hulls. The experimental animals were of mixed Hereford, Shorthorn, and Angus breeds.

A lot of 22 2-year-olds fed a ration of cotton-seed meal and hulls made for 89 days an average daily gain per head of 2.06 lbs. at a cost of 6.49 cts. per pound. The steers sold at $5.65 and the heifers for $5.25 per hundredweight. Estimating them to be worth 3½ cts. per pound at the beginning of the test they would have given a total profit of $257.93.

A lot of 26 yearlings fed for 103 days a similar ration made an average daily gain per head of 1.82 lbs. at a cost of 6.06 cts. per pound. The steers sold at $4.50 and the heifers at $3.50 per hundredweight. The net proceeds would allow only $2.57 per hundredweight as a possible purchase price, which would indicate that yearlings of such condition and size as these should be fed longer for profitable results, and on a ration of not more than 4 to 5 lbs. per head per day.

"Cotton-seed meal and hulls when fed to 2-year-olds give excellent daily gains at profit-making cost. Yearlings will not finish into market conditions in a 100-day period on cotton-seed meal and hulls. A full ration of meal for 2-year-olds, as indicated by this experiment, should not exceed 7.5 lbs. per head per day and probably not more than 7 lbs. per head per day."

Meat production in Germany, H. GERLICH (*Ztschr. Agrarpolitik, 7 (1909), Nos. 7, pp. 348–388; 8, pp. 420–450*).—Statistical tables are used to illustrate the importance of meat production in Germany, which was formerly only a side issue of agriculture. To offset the high prices of feeds it is pointed out that more economy is needed in saving the waste of the cities which may be used for feeds or fertilizers, and more feeds must be grown at home if meat production is to be profitable. As the acreage in Germany can not be increased to any extent the yields per acre must be increased and every available foot of land must be utilized.

On the value of milk for fattening calves, BÄSSMANN (*Milch Ztg., 38 (1909), No. 26, pp. 304, 305*).—On a ration composed of skim milk and whole milk the average returns for the whole milk for fattening 3 calves was 14.1 pfennig per liter (about 3.5 cts. per quart), when the skim milk was estimated to be worth 2.5 pfennig per liter (about 0.6 per quart). On a ration of whole milk alone 1 calf returned a value of 10.6 pfennig per liter (about 2.6 cts. per quart).

Winter and summer calf rearing, J. M. ADAMS and W. F. PRENDERGAST (*Dept. Agr. and Tech. Instr. Ireland Jour., 9 (1909), No. 4, pp. 695–703*).—The expense of raising the calves of the cows used in the experiments of the authors noted on page 673 of this issue was as follows: The November calves of the first experiment showed a profit of £2 5s 8d and the April calves a loss of £4 2s 1d. In the second experiment the winter calves showed a profit of £3 4s 11d; the summer calves a loss of 8s 1d.

A successful ovarian transplantation in the guinea pig, and its bearing on problems of genetics, W. E. CASTLE and J. C. PHILLIPS (*Science, n. ser., 30 (1909), No. 766, pp. 312, 313*).—The ovaries were removed from an albino guinea pig about 5 months of age and replaced with ovaries of a black guinea pig about 1 month old. The albino was then mated with an albino male and 6 months later bore 2 black pigmented young. Evidently the transplanted ovaries became functional as no modification of the germ cells could be detected as a result of the changed environment. It is pointed out that the so-called modifications obtained by other investigators (E. S. R., 21, p. 372) may have been due to the fact that the ova may have come from the regenerative tissues of the mother rather than from the tissue of the introduced ovaries.

Action of the corpus luteum, P. BOUIN and P. ANCEL (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 12, pp. 505–507*).—Studies on the rabbit apparently show that the changes which take place in the uterus preparatory to the attachment of the ova are due to the influences of the corpus luteum.

Corpus luteum and mammary gland, P. ANCEL and P. BOUIN (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 14, pp. 605–607; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 4, p. 448*).—Further studies with a virgin rabbit indicate a correlation between these 2 organs, both of which reach their maximum development in 14 days. The development of the mammary gland has two phases

during gestation: The first or kinetic, when the cells are rapidly formed, and which is determined by the secretion of the corpus luteum, and the second or glandular phase, which is conditioned by some other factor.

The spermatogenesis of the domestic guinea (Numida meleagris), M. F. GUYER (*Anat. Anz., 34 (1909), No. 20–21, pp. 502–513, pls. 2*).—The author finds that although there are several departures from those recorded for the spermatogenesis of most vertebrates, the general order and most of the minor details with guinea fowl are similar to those of the pigeon previously determined, including the double numerical reduction from the spermatogonial number of chromosomes brought about through a pairing of the chromosomes both in the primary and secondary spermatocytes.

An important point determined was the existence of an accessory chromosome common to insects, which possibly has some bearing on the determination of sex. Seventeen chromosomes differing in size occurred in the spermatogonia. Nine appear for division in the primary spermatocytes, of which 8 are presumably bivalent, the other being accessory and passing undivided to one pole of the spindle in advance of the others. "At the division of the secondary spermatocyte the odd chromosome after lagging for some time divides longitudinally. The divisions of the secondary spermatocytes result in the production in equal numbers of 2 classes of spermatids, those containing the odd chromosome and those without it. The two kinds of spermatids are visibly different and ultimately give rise to spermatozoa which differ in size."

The spermatogenesis of the domestic chicken (Gallus gallus), M. F. GUYER (*Anat. Anz., 34 (1909), No. 22–24, pp. 573–580, pls. 2*).—In the spermatogenesis of the chick, as in that of the guinea, there is an accessory chromosome, a double numerical reduction to one-fourth the spermatogonial number of chromosomes, and two sizes of spermatozoa. In the first division of the spermatocytes the odd chromosome not infrequently reveals a tripartite structure. Often one of its components seems to stand more or less apart and behaves much after the manner of a supernumerary chromosome. The odd chromosome passes undivided to one pole in the vast majority of cases. Thus one daughter cell receives 8, the other 9 chromosomes. The final result of the two divisions of the spermatocytes is the production of 4 spermatids, two of which receive 4, and two 5 chromosomes.

Parthenogenetic segmentation in birds, A. LÉCAILLON (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 1, pp. 52, 53; Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 23, pp. 1053–1055; abs. in Jour. Roy. Micros. Soc. [London], 1909, No. 4, p. 447*).—The author has observed a true parthenogenetic cleavage in unfertilized eggs of the fowl. Mitosis appears to be abnormal, as it affects only a part of the cicatricula, proceeds more slowly than in fertilized eggs, and the cells gradually degenerate. The segmentation of parthenogenetic eggs appears to be similar to that of eggs fertilized by weakened spermatozoa, which occurs when the males have been removed from the breeding pen for some time.

Studies on the physiology of reproduction in the domestic fowl. A case of incomplete hermaphroditism, R. PEARL and MAYNIE R. CURTIS (*Biol. Bul. Mar. Biol. Lab. Woods Hole, 17 (1909), No. 4, pp. 271–283, pls. 2, fig. 1*).—The authors describe a Barred Plymouth Rock bird which externally resembled a normal hen, although the comb and wattles were abnormally large, a condition similar to the antero-posterior gynandromorphism of insects. "Internally the bird possessed on the left side a large, lobulated gland in the position and anatomical relations normal to the ovary. There was also a fully developed, normal oviduct, in functional condition on the left side of the body. On the right side of the body was a small organ in the position and anatomical rela-

tions normal to the right testis. Attached to this organ was a normal epididymis and vas deferens leading to the cloaca. Microscopical examination showed that both sex glands were in a condition of extreme degeneration. Neither spermatogenesis or oögenesis could be found in any part of either gland. . . .

"The case shows clearly enough that the secondary sexual characters of both sexes may exist without the accompaniment of functionating germinal epithelium in the same individual. It does not prove that the secondary characters may originally develop in the absence of the functioning of the primary glands, because of the uncertainty as to whether either of the glands was ever functional in this specimen. . . . The present case, of course, affords no direct evidence as to whether a secretion influencing secondary sexual characters may not be produced by the interstitial or stromal cells. A further point of considerable interest lies in the fact that in this bird we have a fully developed, normal, and so far as can be told, entirely functional oviduct in the absence of a functional ovary."

Barring in Plymouth Rocks, W. J. SPILLMAN (*Poultry, 6 (1909), No. 1, pp. 7, 8, 14, figs. 6*).—This is an explanation of how the transmission of barring in Plymouth Rocks may be accounted for according to the sex chromosome theory.

The peculiar inheritance of pink eyes among colored mice, W. E. CASTLE and C. C. LITTLE (*Science, n. ser., 30 (1909), No. 766, pp. 313, 314*).—The authors think that the dilute or pale series of color variations of mice and guinea pigs is a qualitative and not a quantitative modification of the usual or intense series. The dilution is demonstrably interchangeable from one color variety to another, so that it may conveniently be treated as due to an independent factor. The authors recognize 4 series of color varieties among mice, 2 dark-eyed and 2 pink-eyed. Specific illustrations are used to explain their views. Nine Mendelian factors are now recognized as concerned in the color variations of mice, namely, general color, dilution, spotting, pink-eye or paucity, yellow, brown, black, restriction, and agouti.

The mnemic sensibilities in their relation to the original sensations, R. SEMON (*Die Mnemischen Empfindungen in ihren Beziehungen zu den Originalempfindungen. Leipzig and London, 1909, pp. XV+392; rev. in Nature [London], 81 (1909), No. 2080, p. 302*).—This is a further discussion and explanation of the author's mnemic theory, by which he claims that the inheritance of acquired characters can be proved. This theory may be considered a modified form of Hering's memory theory. Permanent changes of living matter as caused by external stimuli are termed "engrams," and the sum of engrams in an organism is its "mneme." The inheritance of acquired characters is accounted for by the transmission of the effects produced by the stimulus from the organized matter first affected to all other parts of the organism, either by nerve paths or by proplasmic intercellular filaments. In this way faint engrams may be made on the reproductive organs.

For further discussions of this theory see Darwin's presidential address (E. S. R., 21, p. 318), and a previous note by Weisman and Semon (E. S. R., 18, p. 1058).

Telegony as induced reversion, O. F. COOK (*Science, n. ser., 30 (1909), No. 764, pp. 241–243*).—A new point of view is suggested for looking at the facts grouped under telegony. These facts are examples of reversion and are sequels of hybridization. Hybridization, like other conditions, may influence the expression though not the transmission of characters. Atavistic changes appear more frequently in some series of hybrids than in others. "If reversions prove to be more frequent after hybridization telegony will be estab-

lished, though its manifestations may not be otherwise different from reversions that occur without hybridization."

Domesticated animals of the Altai-Kalmucks, T. NOACK (*Zool. Anz., 34 (1909), Nos. 22–23, pp. 683–695; 24–25, pp. 750–760*).—From an anatomical study of the domesticated animals of the Kalmuck population in the region of the Altai mountains the author thinks that the dog is of the same type as the north Russian and north Asiatic laika dog; the cat, a near relative of *Felis microtis;* the sheep, closely allied to *Ovis arkal;* and the cattle, which are similar to those of the Kirgis, appear to be a cross between *Bos brachyceros* and *B. primigenius.*

The possible ancestors of the horses living under domestication, J. C. EWART (*Science, n. ser., 30 (1909), No. 763, pp. 219–223; Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 549, pp. 392–397*).—These are abstracts of a paper presented before the Royal Society, London.

The anatomical differences of 6 species, the possible ancestors of the domestic horse, are briefly described. Three of these species, which have been found in the Pliocene deposits, are *Equus sivalensis*, the oldest true horse known to science, found in the Siwalik deposits of northern India, *E. stenonis* of Europe and northern Africa, and *E. gracilis* (*Asinus fossilis* of Owen), also found in Europe and Africa. The three principal Pleistocene types are *E. namadicus*, *E. fossilis*, and *E. robustus.* Some relationships between these species and the modern breeds are briefly noted.

Capturing and domesticating mountain sheep, W. FRAKES (*Recreation, 30 (1909), No. 4, pp. 184, 185, figs. 5*).—This is an account of the author's experience with the California or Nelson's sheep, a somewhat smaller animal than the bighorn or Rocky Mountain sheep. Though they are wild, difficult to capture, and subject to pneumonia when exposed to rain storms, it is possible to tame them and keep them in good health in captivity if properly cared for.

The evolution of a breed of cattle, J. WILSON (*Mark Lane Express, 102 (1909), No. 4068, p. 293*).—This is an abstract of a paper read before the British Association at Winnipeg, 1909.

The Aberdeen-Angus breed is used to illustrate the fact that nearly every breed of cattle is the result of crossing several breeds. The races which may be considered as factors in the origin of this breed are the Urus, the black Celtic brought to Britain before the Urus became extinct in the Bronze Age, the brown race of the Belgæ, the white race of the Romans, and the hornless breed of the Norsemen. In the eighteenth century many large Dutch-flecked cattle were taken to the northeast of Scotland and crossed with the native stock, thereby increasing the size. When in the middle of the eighteenth century a demand for hornless cattle arose in England, the large horned cattle were crossed with the Norse hornless, finally resulting in the modern Aberdeen-Angus stock.

Some early history concerning the Shorthorn breed in New England, E. W. MORSE (*New England Farmer, 87 (1908), No. 9, p. 8*).—Brief notes on early importations of pure-bred Shorthorns and their influence on cattle breeding in New England.

Bovines and their products, A. GINDRE DE MALHERBE (*Les Races Bovines et Leurs Produits. Paris, 1908, pp. LVI+591, pls. 6, figs. 136*).—This is a popular work on modern breeds of cattle and other species of the genus Bos, feeding and rearing cattle, dairying, dieseases of cattle, and European cattle legislation.

Catalogue of the cattle exhibit of the Hoorn division of the Holland Agricultural Society and the provincial union of breeders' associations (*Catalogus der Veetentoonstelling Samengesteld door de Hollandsche Maatschappij van*

Landbouw Afd. Hoorn en de Provinciale Bond van Fokvereenigingen. The Hague, 1909, pp. 20, pls. 20).—This contains an account of the breeders' associations of the province of North Holland, by L. T. C. Scheij, and measurements, yields of milk, and other data of over 100 animals belonging to the associations, by G. Nobel.

[**Live stock statistics of Argentina**], A. B. MARTINEZ (*Censo Agropecuario de la Nacion: Primeros Resultados. La Industria Ganadera. Buenos Aires: Govt., 1908, pp. 32*).—The live stock statistics of different provinces in Argentina are tabulated and compared with those of 1895. Since 1895 there has been an increase of 2,605,339 cattle, 844,568 horses, 462,521 pigs, 8,550 asses and mules and a decrease of over 18,000,000 sheep.

Don't kill the laying hen, T. F. POTTER (*Downers Grove, Ill., 1908, pp. 102, figs. 29*).—This book describes a method of selecting laying and nonlaying hens, and contains information on the causes which affect the laying qualities. There are numerous illustrations which show the ovaries in normal and pathological conditions.

Note on an artificial incubator, A. CARTIER (*Bul. Écon. Indo-Chine, n. ser., 11 (1908), No. 75, pp. 706–710, figs. 3*).—This is a description of an incubator for hatching ducks which is used in Annam, Indo-China. Layers of eggs are alternated with layers of paddy in cylindrical baskets, which are also surrounded by paddy. Directions are given in detail for the examination and management of the eggs.

DAIRY FARMING—DAIRYING.

Experiments on the feeding of dairy cows, F. P. WALKER (*Durham County Council, Ed. Com., Offerton Bul. 3, pp. 5–20; abs. in Dairy, 21 (1909), No. 248, p. 217*).—This is a report of an experiment to discover the effect of feeding brewers' grains upon the quantity and quality of milk and is a continuation of earlier work (E. S. R., 18, p. 870).

Two lots of 5 cows each were used in this experiment, which lasted 10 weeks. The daily ration of lot 1 consisted of 4 lbs. of maize meal, 2 lbs. of Bombay cotton cake, 3 lbs. of chopped straw, 12 lbs. of hay, 20 lbs. of brewers' grains, and 20 lbs. of swedes per 1,000 lbs. live weight. The average daily yield per head for this lot was 11.435 qts. of milk, containing 3.34 per cent milk fat and 13.48 per cent total solids. Lot 2, which received a similar ration except that the brewers' grains were replaced by 40 lbs. of swedes, gave an average daily yield per head of 11.505 qts. of milk, containing 3.37 per cent fat and 13.44 per cent total solids. Lot 1 lost on an average 2.5 lbs. per head in body weight, whereas lot 2 made an average gain in body weight of 5.6 lbs. per head.

At the end of the above experiment the rations of the 2 lots were reversed, with the following results: The average daily yield of lot 1 for 10 weeks was 10.595 qts. milk, containing 3.49 per cent fat and 9.21 per cent solids-not-fat. Lot 2 gave an average daily yield per head of 10.86 qts. milk, containing 3.45 per cent fat and 9.09 per cent solids-not-fat. Both lots lost in body weight, the first lot losing 14 lbs. and the second lot 19.6 lbs. per head.

Milk production, J. M. SCOTT (*Florida Sta. Bul. 99, pp. 3–10*).—These experiments have been noted from another source (E. S. R., 21, p. 375).

Winter milk production, J. M. ADAMS and W. F. PRENDERGAST (*Dept. Agr. and Tech. Instr. Ireland Jour., 9 (1909), No. 4, pp. 665–694, pls. 4, dgms. 4*).—This is the first report on studies undertaken to ascertain the cost of producing milk in Ireland in winter, at which time so little butter is placed on the market that the Irish trade in the British butter markets is practically lost. On one farm the profit on 5 winter-milking cows was £21 10s. 5d., and on 5 summer-

milking cows, £9 3d. On another farm with the same number of cows, the profit on the winter cows was £29 5s. 1d., and on the summer cows £23 4s. 5d.

Cow test association work in Maine, L. S. MERRILL (*Bul. [Maine] Dept. Agr., 8 (1909), No. 3, pp. 79–169*).—This bulletin contains a report for the year 1908–9 of the work of the first two cow test associations organized in Maine and milk records of the herds belonging to the members of the association.

Milk yields of different cattle breeds in Steiermark, A. GSTIRNER (*Österr. Molk. Ztg., 16 (1909), No. 14, pp. 187, 188*).—Milk yields are reported of 1,807 cows belonging to 18 different breeds and cross breeds.

The introduced breeds averaged larger yields than the native cattle. The yields of the three best herds were as follows: Twenty-two cows of the Algäu X Oberinntal averaged 2,872 kg. of milk per head, containing 3.89 per cent fat; 22 cows of the Montavon X Meran averaged 3,077 kg. of milk per head, containing 3.62 per cent fat; and 18 Simmental cows averaged 2,945 kg. of milk per head, containing 3.17 per cent fat. Suggestions are given for improving the native cattle by crossing with improved dairy breeds.

The dairy industry in Argentina, E. FYNN, Jr. (*In Censo Agropecuario Nacional la Ganadería y la Agricultura en 1908. Buenos Aires: Govt., 1909, vol. 3, pp. 301–312, pl. 1*).—This is a brief account of the growth and present condition of dairying in Argentina.

The dairy characteristics of the Valaque sheep, O. LAXA (*Rev. Gén. Lait, 7 (1909), Nos. 13, pp. 289–300, pls. 4, chart 1; 14, pp. 313–328; 15, pp. 337–347; 16, pp. 361–373; 17, pp. 391–402*).—This series of articles contains a brief account of the dairy industry in the region of the Carpathian Mountains.

The breeds of sheep in this region belong principally to the species *Ovis aries strepsiceros*. One of the important dairy breeds is known as the Valaque or Transylvanian. The author has made an extensive study of the yields of this breed and reports a large number of analyses of the milk. The results are presented in tabular form. A bibliography on the subject is appended.

Handbook of milk, P. SOMMERFELD ET AL. (*Handbuch der Milchkunde. Wiesbaden, 1909, pp. XIV+999, pls. 3, figs. 234*).—This valuable compilation on milk and its properties is the work of specialists and includes the latest researches on the subject, with numerous references to the literature. Nearly one-half of the book is occupied with the topics of milk secretion, ferments and organisms in milk, and sterilization and pasteurization. The chemical and physical changes in milk from the moment of its secretion until the time of using are also treated in detail.

The list of subjects in the table of contents is as follows: Physiology of Milk Secretion, by M. Pfaundler; Physical Properties, by H. Koeppe; General Chemistry of Milk, by R. W. Raudnitz; Quantitative Analysis, by F. Reiss and P. Sommerfeld; Milk Ferments, by E. Seligmann; Saprophytes in Milk, by H. Weigmann; The Transmission of Disease by Means of Milk, by A. Weber; The Passing of Toxins and Antibodies into Milk and Their Transference to Nurslings, by P. H. Römer; Stables, by A. Schlossmann; Diseases of Dairy Animals, by J. Bongert; Management of Milk, by H. Weigmann; Sterilizing and Pasteurizing, by H. Tjaden; Special Arrangements for Supplying Milk to Infants, by H. Neumann; Investigation of Milk and Milk Products, by F. Reiss; Human Milk, by St. Engel; Milk of Other Animals, by A. Burr; A Table of the Properties and Composition of Different Milks, by R. W. Raudnitz; and Market Milk and Milk Regulations, by A. Schlossmann.

On the starch-like structures in the milk glands of cattle, A. ZIMMERMANN (*Ztschr. Fleisch u. Milchhyg., 19 (1909), No. 12, pp. 425–429, pl. 1*).—The granules often found in the alveoli and alveolar tissues of the mammary glands are figured and described.

In structure the granules resemble starch grains but do not give the typical reactions of amyloid substances. The micro-chemical reactions obtained by the author were more like those of a lipoid, although they were only slightly soluble in ether and chloroform. The granules contained a central nucleus with concentric layers. They varied somewhat in shape and in size from 5 to 200 microns. Although found in animals of all ages and at all periods of lactation, they were more numerous in older cows, sometimes as many as 10 or 12 being found in one alveolus. The central nucleus and the presence of the smaller granules in the alveoli alone and not in the tissues indicate that they are formed in the alveolus about some particle of foreign matter as a center.

The influence of feed on the composition of milk, C. PORCHER (*Hyg. Viande et Lait, 3 (1909), No. 9, pp. 409–425*).—This is a discussion of some European investigations on this topic.

The passing of medicaments and toxic substances into milk, C. PORCHER (*Hyg. Viande et Lait, 3 (1909), No. 9, pp. 425–437*).—Some recent investigations are discussed with reference to the effect on the consumer of using milk which has absorbed toxic substances or drugs which may have been administered to the lactating animal.

The transfer of boric acid from cattle food to cow's milk, S. H. COLLINS (*Durham County Council, Ed. Com., Offerton Bul. 3, pp. 21–24; abs. in Dairy, 21 (1909), No. 248, p. 217*).—This experiment was undertaken because boric acid is often used to prevent Indian cotton-seed cake from becoming moldy. Boric acid appeared in the milk as soon as cows were fed daily ¼ lb. of a meal which contained 5 per cent of boric acid. About one-fiftieth of the boric acid appeared in the milk. When the meal contained 1 per cent of boric acid about one-seventieth appeared in the milk.

"As milk needs ¼ per cent boric acid to produce any useful preservative influence, there seems no difficulty in distinguishing between milk preserved with boric acid and milk contaminated by the use of foods containing boric acid. If milk be found to contain more than 0.1 per cent boric acid the milk has probably been deliberately preserved with some boric preservative, but if less than 0.01 per cent boric acid be found in the milk, the source of that small amount of boric acid is to be looked for in the food of the cow."

Are the colostrum bodies a reliable test for determining the stage of the lactation period? ANDERS (*Arch. Wiss. u. Prakt. Tierheilk., 35 (1909), No. 4–5, pp. 380–415*).—As a rule the period in which colostrum bodies were found varied from 4 to 40 days before, and from 2 to 10 days after, calving. They were sometimes present, however, when cows were considerably advanced in the lactation period, especially after a sudden change in the feed, and they were also found in the udders of heifers and in cows with diseased udders, so that the presence of colostrum bodies is not a sure proof that the milk was obtained from a new milch cow. From 1 to 3 days after calving freshly drawn milk gives an acid reaction. Colostrum milk was not found to contain less fat than other milk. The specific gravity of milk, other than the first milk, was quite constant for 4 weeks after calving.

A bibliography of literature on the subject is appended.

The Trommsdorff leucocyte test for milk, G. RÜHM (*Ztschr. Fleisch u. Milchhyg., 19 (1909), Nos. 6, pp. 210–217; 7, pp. 243–251; 8, pp. 271–277; abs. in Rev. Gén. Lait, 7 (1909), No. 13, pp. 309, 310; Milchw. Zentbl., 5 (1909), No. 7, pp. 319, 320*).—This is a critical review relating to the determination of the leucocyte content of milk.

It is thought that the Trommsdorff test is of value as a preliminary diagnosis of mastitis and other diseases of the udder. It is by no means a positive proof but is a simple and easy method of dividing the herd into sound and suspicious

animals. Those under suspicion should undergo further diagnosis by a competent veterinarian.

A bibliography is appended.

The reduction v. the fermentation test, J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream., 28 (1909), No. 18, p. 730*).—This is a discussion of the relative advantages of the two tests, with comments on the views of Jensen and Barthel. The author thinks the reduction test is more valuable for controlling the milk supply of cities and the fermentation test of more use for cheese makers, but sees no reason why they may not be combined as suggested by Jensen.

The multiplication of Bacillus coli in milk kept at 10, 20, 30, and 37° C., F. C. HARRISON and J. VANDERLECK (*Rev. Gén. Lait, 7 (1909), No. 15, pp. 347–353*).—The object of these experiments was to ascertain the rate of increase of *B. coli* under good, hygienic conditions, and to obtain precise information as to the restraining action of lactic-acid bacteria.

At 37° C. the principal increase of organisms up to the time of curdling was due to *B. lactis acidi*. *B. coli* can increase much faster in beef broth than in milk because it is checked by the acid organisms in the latter medium. At 30° the temperature was still more favorable for *B. lactis acidi*, which was practically the only microbe present when the milk curdled in 17½ hours. At 20° *B. coli* and *B. lactis acrogenes* increased slowly, the average time per generation for both organisms being 142 minutes. At 10° the results were irregular. The temperature was unfavorable for the *B. coli* group, but there was a progressive increase of the lactic-acid bacilli.

The results of this investigation are compared with those of Conn, Esten, and others (E. S. R., 16, p. 1013).

On the longevity of diphtheria and paratyphus bacilli in milk, H. E. KERSTEN (*Arb. K. Gsndhtsamt., 30 (1909), No. 2, pp. 341–350; abs. in Chem. Zentbl., 1909, I, No. 24, p. 1900; Milchw. Zentbl., 5 (1909), No. 8, p. 376*).—This article reports experiments with milk as a nutrient medium for several types of diphtheria bacilli and compares the results obtained by previous investigators.

The length of time the different types lived in commercial raw milk ranged from 22 days when kept at the temperature of an ice-box to 63 days at a temperature of 34° C. In sterile milk they remained for 6 months without losing their virulence or other typical biological properties. Paratyphus bacilli survived in commercial milk 61 days in an ice-box temperature, 64 days at room temperature, and 4½ months at 37°. These experiments would indicate that milk does not appear to act as a germicide toward these types of bacilli.

A bibliography of the literature is appended.

Investigation of city milk supply 1908, F. W. ROBISON (*Mich. State Dairy and Food Dept. Bul. 164, pp. 72*).—Data are reported on the percentage of fat and total solids, the time for coagulation, and the Wisconsin curd test of about 2,000 samples of market milk taken in the summer of 1908. Bacterial counts and fermentation tests were made with a portion of the samples.

The composition of milk in the vicinity of Harburg, Province of Hannover, W. BREMER and F. SPONNAGEL (*Milch Ztg., 38 (1909), Nos. 35, pp. 409–414; 36, pp. 421, 422*).—Analyses are reported of 153 samples of milk. The fat content ranged from 1.70 to 4.86 per cent, the average being 3.1 per cent. Solids-not-fat ranged from 8.16 to 9.43 per cent, with an average of 8.75 per cent. The fat content in 41.17 per cent of all samples was between 3 and 3.5 per cent. The evening milk contained more fat than the samples of morning milk.

Production of milk for children, PUSCH (*Die Kindermilchgewinnung. Berlin, 1908, pp. 73, figs. 19*).—An account of the methods of preparing sanitary

milk as practiced at the veterinary school at Dresden. There is also a summary of general information on this topic.

On the influence of high temperature in the sterilizing of milk, Y. KIDA (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 141–144*).—The percentage of digestibility of milk when heated for 30 minutes in a pepsin-hydrochloric acid solution gradually decreased with the increase in temperature, as indicated by the following figures:

In 100 gm. of milk the amount of undigested protein when unheated was 0.762 gm.; when heated at 80° C., 1.53 gm.; at 85°, 1.493 gm.; at 90°, 1.42 gm.; at 95°, 1.54 gm.; and at 100°, 1.719 gm. The amount of lecithin contained in 1,000 cc. of one sample of milk was in the unheated milk 0.467 gm., and in that heated 30 minutes at 95°, 0.349 gm.; in a second sample the figures were 0.505 gm. in the unheated milk and 0.467 gm. in that heated at 35°; in a third sample, 0.474 gm. in the unheated milk, 0.42 gm. in that heated at 80°, and 0.444 gm. in that heated at 75°; and in a fourth sample, 0.351 gm. in the unheated milk, 0.351 gm. in that heated at 100°, and 0.407 gm. in that heated for 30 minutes in an autoclave above 100°.

The commercial pasteurization of milk, B. R. RICKARDS (*Amer. Jour. Pub. Hyg., 19 (1909), No. 3, pp. 507–513*).—This is an abstract of a paper read before the American Public Health Association at Winnipeg, August, 1908.

The establishments of 3 firms for pasteurizing milk for the Boston trade were visited and samples were taken as the milk went into the pasteurizer and came from the cooling apparatus. Out of 125 samples taken at different times only 22 were below the limit of 500,000 bacteria per cubic centimeter. When kept for 24 hours at ice-box temperature the bacteria increased four times as fast in the pasteurized as in the unpasteurized milk.

"Pasteurized milk seems to keep longer, but eventually acquires a strong odor and really may be said to decompose rather than sour. . . . By the reduction of the number of bacteria through the heating process, the criterion by which we now judge a dirty, old, or improperly kept milk, is temporarily lost. . . . A false sense of security is undoubtedly conveyed by the term pasteurized milk. The lack of security may come from either improper pasteurization, the pasteurization of improperly handled milk, or improper care of pasteurized milk. . . . Pasteurized milk may well mean cooked dirt, cooked dung, and cooked bacterial products, and the laboratory is powerless to detect it unless apparent to the naked eye. . . . The pasteurization of milk in itself is probably not a harmful process, and is, perhaps, to a certain extent a necessity under modern conditions in large cities, but commercial pasteurization should be carried on only under the most stringent supervision. . . . The pasteurization of milk affects the microscopic estimate of bacteria and leucocytes."

Economic reasons for the reduction of milk to powder, L. C. MERRELL (*Canner and Dried Fruit Packer, 29 (1909), No. 8, pp. 30, 32, 34, 36*).—This is a paper read before the Syracuse section of the American Chemical Society.

When properly desiccated, milk is not essentially altered from its natural characteristics as a food, but may be preserved for an indefinite length of time without the addition of any preservative substance. For desiccating rapidly at a low temperature the concentration of lactic acid has little effect on the casein. According to the author, by partially evaporating milk and then spraying it into a current of hot air the albumin will not be coagulated. It is stated that milk could be sold in New York City in a powdered form at an equivalent of 6 cts. per quart and yet afford a margin of profit for all concerned. Other advantages of dried milk are pointed out.

The coagulation of condensed milk, R. GREIG-SMITH (*Proc. Linn. Soc. N. S. Wales, 34 (1909), pt. 1, pp. 107–113*).—A microbe of probable widespread occur-

rence has been isolated from coagulated condensed milk, which the author believes to be the cause of this trouble. It is distinguishable from *Micrococcus pyogenes albus* only by its being nonpathogenic to mice. The action of the microbe is accelerated by calcium carbonate.

Extracts from the fourth annual report of the dairy research laboratories at Jaroslav, April, 1909, C. MAASS (*Milchw. Zentbl., 5 (1909), No. 8, pp. 329–344*).—Analyses of milk and butter and investigations on the rancidity of butter are reported, and a method of preparing dried cultures of lactic-acid bacteria is described.

The specific gravity of cow's milk ranged from 1.029 to 1.0355, the fat content from 2.5 to 7.4 per cent, with an average of 4.2 per cent, and the sugar content from 3.06 to 5.60 per cent. The average ash content was 0.71 per cent, and the average total solids 13.17 per cent. The specific gravity of goat's milk ranged from 1.0292 to 1.0391, the sugar content from 3.11 to 4.79 per cent, and the fat from 1.4 to 8.5 per cent.

A number of constants in butters were determined. The Reichert-Meissl number varied from 21.9 to 34.6. The higher figure was reached in butter made in January, and in the average number of samples it gradually decreased until the autumn months. The refractometer readings varied from 40.6 to 45.9, and the specific gravity from 0.8632 to 0.8720.

In continuation of earlier work on the rancidity of butter the effect of preservatives on fat splitting ferments was studied. As a preliminary study, thymol, chloroform, formalin, bichromate of potash, and boric acid were added to cream and stored at a temperature of 15 to 18° for 2½ months. The cream was then made into butter and the acidity and refractive index determined. Chloroform did not render the cream sterile. Thymol became dissolved in the fat and naturally affected the refractive power. The bichromate of potash restrained both the action of bacteria and the ferments. Formalin appeared to have no influence in increasing the acidity and was selected as the best preservative for further experiments.

In testing the milk of various cows it was found that at the end of the lactation period milk contains a large amount of ferment. In studying the effect of pure cultures of bacteria, yeasts, and fungi on the acidity of cream *Penicillium glaucum* was found to increase the acidity, and also *Oïdium lactis*, but in a lesser degree. Peptonizing bacteria had no effect on acidity. A species of yeast was found to prevent the growth of *P. glaucum* and *O. lactis*, and it is suggested that this yeast may be added to butter to prevent rancidity. All of these experiments seem to show that rancidity does not progress rapidly from purely chemical and physical causes.

Twenty-second annual report of the Bernese Dairy School at Rütti-Zollikofen, A. PETER ET AL. (*Jahresber. Molk. Schule Rütti-Zollikofen, 22 (1908–9), pp. 54, fig. 1*).—This report contains the results of experiments in the manufacture of butter and cheese, analyses of milk and dairy products, and notes on the dairy industry and related matters.

A. Peter and G. Koestler have studied the relation of milk constituents to the composition of Emmental cheese. The average figures for 12 normal cheeses are as follows: Amount of milk 1,197 kg., fat 3.4 per cent, total solids 12.45 per cent, weight of green cheese 112 kg., weight of ripened cheese 102 kg., fat content in cheese 31.58 per cent, total solids in cheese 66.34 per cent, relation of total solids of the milk to the yield of ripened cheese 1 : 0.685, and relation of fat in the milk to the fat of the total solids in the ripened cheese 1 : 14.04.

G. Koestler reports that in analyses of pure butter obtained from various sources the Reichert-Meissl number varied so much as to make it of doubtful value as a means of distinguishing between butter and margarin. The same

investigator reports experiments in yield of whey butter. In an average of 12 experiments 4.71 kg. of butter was obtained from 1,000 kg. of milk in the ordinary cheese kettle, 3.06 kg. by introducing a jet of steam into the whey, and 0.93 kg. when the whey was run through the separator.

A study of Pennsylvania butter, H. E. VAN NORMAN and C. W. LARSON (*Pennsylvania Sta. Bul. 93, pp. 3–14*).—This bulletin contains a report of the butter-scoring contest of 1908–9 conducted by the dairy husbandry department. The average of all the scores showed that the best butter was made in June and August and the poorest in March. The most common causes of poor flavor were old, overripe cream, and a cowy flavor due to the uncleanly methods of the producer. Many useful hints are given for practical butter makers.

Concerning "short" cheese, F. W. J. BOEKHOUT and J. J. OTT DE VRIES (*Rev. Gén. Lait, 7 (1909), Nos. 17, pp. 385–391; 18, pp. 418–423; Centbl. Bakt. [etc.], 2. Abt., 24 (1909), Nos. 5–7, pp. 122–129*).—A continuation of earlier work (E. S. R., 19, p. 474).

The authors find that bilactate of paracasein produced by an excessive amount of pure lactic acid is the direct cause of "short" cheese. Milk deficient in lime is a predisposing cause, as the bilactate is formed when there is insufficient lime to neutralize any excess of lactic acid that may be produced.

[Analyses of cheese] (*Bol. Dir. Geral Agr. Estac. Agron. Lisboa, 9 (1909), No. 3, pp. 24–27*).—Analyses are reported of 104 samples of different varieties of cheese made from cow's, sheep, goat's, and mixed milks.

Milk rules for patrons of cheese factories in West Prussia (*Molk. Ztg. Berlin, 19 (1909), No. 33, pp. 387–389; N. Y. Produce Rev. and Amer. Cream., 28 (1909), No. 20, pp. 812, 813*).—These rules were established by the cheese makers because of the inferior quality of milk supplied in that locality, where a large amount of Tilsiter and imitation Emmental cheese is made. Although not suitable for conditions in other countries, they may furnish suggestions for operators of cheese factories where slack methods prevail among the patrons.

Annual report of the cheese experiment station at Lodi, 1908, C. BESANA ET AL. (*Ann. R. Staz. Sper. Caseif. Lodi, 1908, pp. 130*).—An account of the work of this station during the year, including investigations which have been previously noted.

A new measuring device, C. A. JOHNSON (*N. Y. Produce Rev. and Amer. Cream., 28 (1909), No. 14, p. 584, fig. 1*).—This is a device for measuring and delivering skim milk or whey to patrons of creameries and cheese factories. It consists of a tank with supply and delivery pipes, by which the amount of liquid can be quickly and accurately delivered.

Lime and lime salts and their relation to dairying, F. M. BERBERICH and A. BURR (*Molk. Ztg. [Hildesheim], 23 (1909), Nos. 32, pp. 895, 896.; 33, pp. 925–927; 34, pp. 953–955; 35, pp. 984–986*).—This series of articles summarizes our present knowledge of the significance of calcium compounds in milk, milk products, feeds, and drinking water, the nutrition of dairy cows, the water supply of creameries and cheese factories, the sterilizing of dairy utensils, the disinfection of cow stables, and other uses of lime in dairying. There are numerous references to the literature on the subject.

VETERINARY MEDICINE.

Report of the chief veterinary officer, S. STOCKMAN (*Bd. Agr. and Fisheries [London], [Vet. Dept.], Ann. Rpts. Proc. 1908, pp. 4–17*).—The attention of the chief veterinary officer is said to have been largely taken up with an investigation of epizootic abortion. Foot-and-mouth disease appeared among cows in a herd in Edinburgh in February, and before it could be stamped out 3 outbreaks

occurred and 244 bovines were destroyed, of which 112 became affected before slaughter. The infection was traced to baled hay received from Holland. "The hay in question had been imported from an infected country fully 2½ months before it was brought in contact with the animals which developed the disease, and assuming that it was contaminated on the farm of origin, of which however we have no evidence, the virus might in such case be held to have remained active for at least 3½ months. It had certainly retained its virulence for 2½ months, since it had during that period been beyond all sources of possible contamination."

During the year 11,599 outbreaks of hog cholera were reported, of which 2,067 were confirmed. There were 1,326 cases which, after inquiry, were found to be swine erysipelas, and 681 of these showed lesions of the heart. There were 789 outbreaks of glanders, in which 2,433 horses were found affected. During 1908, 1,105 outbreaks of anthrax were reported, in at least 160 of which there was evidence of an error in diagnosis. The number of outbreaks of sheep scab was in excess of the 2 years preceding.

Reference is made to Texas fever inoculation experiments conducted in England in collaboration with the veterinary departments of the Transvaal and East Africa Protectorate (E. S. R., 20, p. 791). Working in collaboration with J. M'Fadyean, the author was able to show the blood of animals suffering or recovering from English redwater to be capable of infecting other susceptible cattle with the disease after an incubation period of from 6 to 10 days. The disease appears to be transmitted by both *Ixodes ricinus* and *Hæmaphysalis punctata* as previously noted (E. S. R., 20, p. 1082). A few experiments with the tropical form, or African piroplasmosis, which is much more severe, showed that the nymphs of *H. punctata*, which as larvæ had engorged on infected animals, were capable of transmitting the disease.

Report of the assistant secretary, animals division, A. W. Anstruther (*Bd. Agr. and Fisheries [London], [Vet. Dept.], Ann. Rpts. Proc. 1908, pp. 18–58, pls. 2*).—This is a more detailed account of the outbreaks of foot-and-mouth disease, hog cholera, glanders, and anthrax than that above noted. Of the outbreaks of glanders and farcy reported during the year 749 occurred in England, 9 in Wales, and 31 in Scotland.

[Report of the superintendent of animal industry], V. A. Norgaard (*Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 5 (1908), pp. 123–154*).—This is the fourth annual report of the territorial veterinarian, and relates to the work for the calendar year 1908. In connection with the live stock inspection work it is stated that 13 Shorthorn bulls, 4 Hereford bulls, 65 Merino lambs, and 40 Merino ewes were imported from New Zealand during the year. Glanders was the most important disease of the horse, having occurred principally on the islands of Oahu, Maui, and Hawaii. Epizootic laryngitis was a source of considerable loss on the Island of Hawaii.

Report on the zootechnic, veterinary, and epizootic service of Indo-China, F. Lepinte (*Bul. Écon. Indo-Chine, n. scr., 11 (1908), Nos. 74, pp. 461–485; 75, pp. 600–693*).—A more detailed report of the service than that previously noted (E. S. R., 21, p. 279).

Castration and ovariotomy, E. Hermanos (*Estac. Agr. Expt. Ciudad Juárez, Chihuahua, Bol. 20, pp. 21, pls. 7*).—A detailed, illustrative account.

Further studies upon the phenomenon of anaphylaxis, M. J. Rosenau and J. F. Anderson (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 50, pp. 52*).—"While the use of hypnotics appeared promising for the prevention of anaphylaxis, it seems from our work that they offer little or no practical advantage for this purpose. We used in our experiments urethane, paraldehyde, chloral hydrate, and magnesium sulphate. These substances have practically

no influence upon the fatal outcome of anaphylaxis. Further work upon the specificity of anaphylaxis emphasizes the specific nature of this phenomenon. The effect of heat in modifying or destroying the sensitizing or poisonous properties of proteins probably depends entirely upon its effect in rendering the proteins insoluble, rather than by the production of chemical changes in the protein. . . .

"There is apparently no difference in the subsequent immunity whether the intoxicating injection be given subcutaneously, intraperitoneally, or intracranially. In these cases the immunity was tested 24 hours after the second injection. We present preliminary evidence suggesting that antibodies are concerned in the mechanism of anaphylaxis. The mixture of normal horse serum with the blood serum of a sensitive guinea pig apparently increases the toxicity of the horse serum for sensitive guinea pigs. We have shown that guinea pigs may remain sensitive 1,096 days; that is, a little over 3 years." See a previous note (E. S. R., 20, p. 1183).

On the intestinal resorption of serum antitoxin and milk antitoxin, P. H. Römer (*Ztschr. Immunitatsf. u. Expt. Ther., I, Orig., 1 (1909), No. 2, pp. 171–192; abs. in Milchw. Zentbl., 5 (1909), No. 8, p. 375*).—The author's experiments indicate that the intestinal canal has a greater power to resorb milk antitoxin than a homologous serum antitoxin. These results confirm those obtained by Bertarelli (E. S. R., 17, p. 501).

Form and size of red blood corpuscles in domestic animals, É. Retterer (*Compt. Rend. Soc. Biol. [Paris], 65 (1908), No. 36, pp. 594–596*).—The author finds that the red blood corpuscles of the ox, sheep, goat, pig, and horse are solid. Most are spherical, others hemispherical and lenticular.

Oleander poisoning of live stock, F. W. Wilson (*Arizona Sta. Bul. 59, pp. 381–397, figs. 6*).—The literature showing that the oleander (*Nerium oleander*) is poisonous when eaten by human beings, rodents, and common farm animals is reviewed and experimental data reported.

Three active principles, all of which are glucosids, have been found in the oleander, of which the most important is oleandrin. The oleander occurs native in the Mediterranean regions of the old world, also in Persia, Japan, and the East Indies, whence it has been distributed to most warm countries. It grows readily in the open throughout the southern part of the United States and is much used as a house plant in many northern and eastern homes. Both the white and pink varieties were used in the investigations reported, but little difference in their poisonous action being found. The details in regard to dose, symptoms, and post-mortem appearance in experiments with 2 horses, a cow, a mule, and 3 sheep are reported.

"The amount of oleander necessary to cause death in horses ranges from 15 to 20 gm. of green leaves, and from 15 to 30 gm. of dry leaves. This depends on the condition of the animal at the time the poison is obtained. A full stomach will necessitate more poison. In the case of cows it is safe to say that from 10 to 20 gm. of green leaves and 15 to 25 gm. of dry leaves are sufficient to cause death. For sheep the fatal dose of either green or dry leaves is from 1 to 5 gm. There is little danger in the bark, roots, or flowers since live stock would hardly obtain sufficient poison in that way. . . .

"The general symptoms are increased temperature and pulse, coldness of the extremities, warm body temperature, dilation of the pupils of the eyes, and discoloration of the mouth and nostrils, followed by sore mouth. The body becomes wet with sweat, due to the exertion caused by the powerful heart stimulation. The animal generally refuses to eat or drink during the 24 hours preceding death. This is usually due to soreness of the mouth and throat.

making it painful to masticate and swallow food. The bowels act often and feces are usually greenish in color. The action of the kidneys is increased slightly and color of urine is normal. . . . There is little doubt that numerous cases of oleander poisoning have never been brought to light because of death being attributed to other sources. It is safe to say, however, that many hundreds of animals have been lost in southern Arizona from this shrub."

There is said to be little or no treatment that can be offered once the animal has received a fatal dose. When oleander has been taken by human beings an emetic may be used with more or less success if given promptly. It is recommended that other plants such as pomegranate, Japanese, California, and Amoor River privets, common myrtle, laurustinus (*Viburnum tinus*), and tamarisk be planted for hedge, screen, and ornamental purposes in place of the oleander.

Checking the ravages of loco, C. D. MARSH (*Amer. Rev. of Reviews, 40 (1909), No. 2, pp. 191–196, figs. 14*).—A popular account of this disease based upon investigations conducted by the Bureau of Plant Industry of this Department, previously noted (E. S. R., 21, p. 484).

Diplodia disease of maize (suspected cause of pellagra), E. F. SMITH and FLORENCE HEDGES (*Science, n. ser., 30 (1909), No. 758, pp. 60, 61*).—It is suggested that this fungus may also be the cause of the so-called cornstalk disease prevalent among cattle in the West.

Surra in the Federated Malay States, H. FRASER and S. L. SYMONDS (*Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 185–192*).—The first case of surra in the Federated Malay States was reported in 1903. It has since been observed from time to time in horses, cattle, and dogs. An outbreak in 1905 was responsible for the death of 43 ponies. Mechanical transmission of the disease was effected by four species of flies of the genus Tabanus, but not by flies of the genus Stomoxys. The disease is only met with in horses stabled in the vicinity of the jungle, where flies of the species *Tabanus fumifer* are found.

Experiments conducted with the view of determining whether or not the life cycle of the trypanosomes was carried out by biting flies were inconclusive, but appear to show that the trypanosomes are not found in the gastro-intestinal contents of infected flies after 24 hours. Treatment by means of atoxyl, mercuric chlorid, and tartarated antimony was not encouraging. While the parasites could be caused to disappear from the peripheral circulation and the health of the animal much improved, these results were only temporary.

Occult tuberculosis, H. VALLÉE (*Rec. Méd. Vét., 86 (1909), No. 3, pp. 106–117; Jour. Compar. Path. and Ther., 22 (1909), No. 2, pp. 133–140*).—Attention is called to the fact that in animals, as in man, the invasion of gland tissue by Koch's bacillus does not always lead to the rapid production of macroscopic lesions, this temporary condition of infection by the bacilli being capable of existing for a variable and sometimes a very long time. While to this particular condition of gland infection German authors have applied the term "latent tuberculosis" the author considers "occult tuberculosis" a better one.

The author believes that clinically occult tuberculosis may represent any of the following: "Tuberculosis resulting from a recent infection (when one finds it in animals free from macroscopic lesions); tuberculosis in the process of forming local lesions by extension from preexisting lesions elsewhere in the animal examined; latent or dormant infections with the bacilli, the clinical manifestation of which (the formation of tubercles) is retarded by a local or general condition of immunity, either experimental or natural, as in the case of cattle inoculated with human bacilli tested by inoculation with bovine bacilli after bovovaccination, or calves infected by the ingestion of virulent milk."

The evacuation of tubercle bacilli with the bile in the intestine of animals affected with latent lesions, A. CALMETTE and C. GUÉRIN (*Compt. Rend. Acad. Sci.* [*Paris*], *148* (*1909*), *No. 10, pp. 601–603*).—In continuation of investigations previously noted (E. S. R., 21, p. 178), the authors find that a part of the bacilli introduced into the circulation can be eliminated by the hepatic gland and evacuated with the bile in the intestines. As the bile acts upon the envelope of the bacilli they are more easily absorbed by the healthy intestinal membrane and thus reinfection may readily take place.

The calcification of tuberculous lesions in bovine animals, PIETTRE (*Compt. Rend. Acad. Sci.* [*Paris*], *148* (*1909*), *No. 14, pp. 954–956*).—In bovines the calcification of tuberculous lesions is not a sign of cure, and there is no relation between the virulence and the degree of calcification. Any therapeutic method based on the introduction of calcium salts into the economy is deemed illusory and perhaps dangerous.

What is the normal temperature of cattle? E. C. L. MILLER (*Amer. Vet. Rev., 35* (*1909*), *No. 5, pp. 554–556*).—Records kept of the temperature of 2,397 normal cattle between the age of 1 and 2½ years have, even when kept under favorable conditions, shown a variation from 101.0 to 103.4° F. The average was 102.395°.

Ceratitis enzootic in cattle, A. FUMAGALLI (*Gior. R. Soc. ed Accad. Vet. Ital., 57* (*1908*), *No. 14, pp. 319–322; abs. in Deut. Tierärztl. Wchnschr., 17* (*1909*), *No. 13, p. 184; Amer. Vet. Rev., 35* (*1909*), *No. 5, p. 594*).—The author observed cases in which the disease was transmitted from cattle to cattle and to sheep and dogs by means of the ocular secretions. As a prophylactic measure the author recommends the immediate separation of the healthy from the infected animals, and also disinfection and the destruction of flies.

Echinococcocis of the heart of an ox, HUON and CONOR (*Compt. Rend. Soc. Biol.* [*Paris*], *66* (*1909*), *No. 8, pp. 361, 362*).—The author reports on a case of this affection in a 6-year-old ox which was killed at the Marseille abattoir.

Follicular mange in cattle, BUGGE (*Berlin. Tierärztl. Wchnschr., 25* (*1909*), *No. 28, pp. 522–524; abs. in Vet. Rec., 22* (*1909*), *No. 1100, p. 107*).—The author presents an account of studies made of several large herds of cattle in which follicular mange was widely distributed. The transmission of the disease apparently took place by means of grooming implements and by the cattle rubbing each other.

Bovine piroplasmosis in the vicinity of Algiers, H. SOULIÉ and G. ROIG (*Compt. Rend. Acad. Sci.* [*Paris*], *148* (*1909*), *No. 14, pp. 952–954*).—In continuation of investigations previously noted (E. S. R., 20, p. 284), the authors conclude from the morphological characters and its inoculability that the Piroplasma which they have studied comes near to the *Piroplasma mutans* described by Theiler from the Transvaal and to *P. annulatum* described from Transcaucasia.

Gastro-enteritis in hogs, A. T. KINSLEY (*Amer. Vet. Rev., 35* (*1909*), *No. 5, pp. 576–578, fig. 1*).—Young cockleburs (*Xanthium canadense*) just coming through the ground are reported to have caused the death of 6 months' old shoats in Missouri. Death was due to an acute gastro-enteritis.

Contribution to the study of nodules of the liver of equines, C. MALERBA and P. SCACCO (*Clin. Vet.* [*Milan*], *Sez. Prat., 31* (*1908*), *No. 51, pp. 818–824, fig. 1; abs. in Jour. Trop. Vet. Sci., 4* (*1909*), *No. 3, pp. 474–477, fig. 1*).—A brief review is first given of the opinions concerning the cause of the calcareous nodules of various sizes that occur in the liver of the horse. The authors consider that the eggs of *Distoma lanceolatum* act as foreign bodies, cause inflammation of the tissue, and become the centers of miliary nodular neoformations which later on become calcified.

"While the eggs may be numerous in the nodule, traces of the Distoma have never been discovered. The intermediary host of *D. lanceolatum* is thought to be a mollusk of the genus Planorbis. Embryos of the parasite and the adult worm may be found in water and pass into the stomach of the horse. From the stomach it passes to the beginning of the intestine, gains the duct and makes its way to the biliary ducts where it sets up the changes of ordinary inflammation. As it does not find the conditions in the liver favorable, it deposits eggs, leaves the liver for the intestine, and passes out with the feces."

Although the authors have never been able to demonstrate the parasites in the nodule, they do not deny the possibility of their becoming at times the center of a nodule.

Some observations on equine piroplasmosis, A. PRICOLO (*Rev. Gén. Méd. Vét., 13 (1909), No. 146, pp. 60–64; abs. in Jour. Trop. Vet. Sci., 4 (1909), No. 3,* p. *455*).—This is a contribution from the military laboratory of veterinary bacteriology at Rome.

The disease is said to be generally disseminated over Italy, certain centers of permanent infection being present from which it has a tendency to extend. It also appears in Rome in the hot season and the author has microscopically diagnosed it in blood from Nettuno, Civita Vecchia, Vicenza, Persano, Bologna, and Chieta. The most successful treatment so far adopted consists in the suppression of all drugs and allowing as much pure water as the animals will drink.

Rabies in very young dogs, P. REMLINGER (*Rev. Gén. Méd. Vét., 12 (1908), No. 143, pp. 617–624; Compt. Rend. Soc. Biol. [Paris], 65 (1908), No. 34, pp. 508, 509; Jour. Trop. Vet. Sci., 4 (1909), No. 3, pp. 485–490*).—By the passage of the rabid virus through a young dog its virulence is increased and under similar circumstances this renders it more dangerous to man than that of an adult dog. Of 9 small dogs inoculated with small doses of street virus 7 contracted the disease. The percentage is much higher than that obtained with adult dogs under similar conditions. In the majority of observations the virus inoculated beneath the skin of the dog demonstrated an incubation period analogous to that which would have been shown had it been inoculated subdurally in the rabbit. From a clinical point of view rabies in young dogs has no great difference from that in older dogs and is not more difficult to diagnose.

Microsporosis of the dog, SABOURAUD, SUIS, and SUFFRAN (*Rev. Vet. [Toulouse], 34 (1909), Nos. 1, pp. 1–14; 2, pp. 73–84; 3, pp. 137–149, figs. 4*).—The authors here report at some length the results of studies made of 15 cases of ringworm. The *Microsporum lanosum* is said to occur very frequently in dogs in the region about Toulouse.

Diseases of the dog and their treatment, G. MÜLLER and A. GLASS (*Philadelphia, [1908], 2. ed., rev. and enl., pp. XVII+419, pls. 10, figs. 93*).—A second revised and enlarged edition of this work, in which the articles on distemper, rabies, and tuberculosis have been rewritten.

Hyoscine-morphine-cactin the most desirable anesthetic for dogs, D. M. CAMPBELL (*Amer. Vet. Rev., 35 (1909), No. 5, pp. 568–570*).—A compound of hyoscine 1/100 grain, morphin 1/4 grain, and cactin 1/67 grain is considered to be the safest anesthetic for dogs. The greatest advantage noted from its use is the quiet it induces after operation.

Natural infection of the guinea pig with Malta fever, C. NICOLLE and E. CONSEIL (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 12, pp. 503–505; abs. in Jour. Trop. Vet. Sci., 4 (1909), No. 3, p. 485*).—While it is not easy to infect a guinea pig with Malta fever, recent observations show that it may become naturally infected. In 5 guinea pigs purchased from a Maltese goat keeper, 2 were found to have an agglutinating power of 300 and from 1 of these the

authors were able to isolate easily the micrococcus from the spleen and liver. It was also found that the agglutinating power was transmitted hereditarily to the young. Three others similarly infected have since been discovered.

An investigation of the mortality of incubator chicks, E. F. PERNOT (*Oregon Sta. Bul. 103, pp. 3–16*).—This is a report of an investigation into the cause of the high mortality of incubator chicks previously noted (E. S. R., 20, p. 472).

Plate cultures were made from pipped eggs that failed to hatch and a large number of others to determine the number of kinds of micro-organisms present. The number of colonies developed was so great in many instances that a straight platinum needle had to be substituted for the loop used in securing the samples. In all 15 kinds of organisms were found, each of which was tested for its pathogenesis by inoculating chicks of different ages with bouillon cultures. Only one of the 15 was fatal. With this bacillus, known as B. No. 9, further experiments were conducted. Its morphological and biological characters are here described.

All the eggs examined contained micro-organisms, even in the early stages of their development in the ovaries. B. No. 9 was not found in any of the fresh eggs examined but was constantly found in the unabsorbed yolks of all chicks that had failed to hatch, and all chicks that died shortly after hatching. Organisms were found to pass through the shell during the process of hatching and more readily through those in an incubator than those under the hen.

In explanation of the fact that eggs under a sitting hen are not infected with B. No. 9, although those in an incubator are, it is suggested that the body of the hen transmits to the egg shell an oily substance which fills the pores of the shell and prevents the entrance of organisms to the egg content. Contamination of the eggs through the daily contact with the hands in turning may account for the mortality due to B. No. 9 in incubators that had been fumigated. A magnetic incubator was experimented with as a step toward determining whether the magnetic force transmitted by the hen is an important factor in successful incubation.

An account is given of fumigation experiments conducted. If an egg contains any pathogenic germs at the time it is laid it is impossible to destroy them, by disinfectants or by any other means, without destroying the vitality of the egg. Pathogenic organisms including B. No. 9 were destroyed by formaldehyde gas when exposed in an incubator. Since it is highly probable that the infection with B. No. 9 occurs in many cases after the release of the chick from the egg, fumigation of the incubators before placing the eggs in them is considered a wise precaution.

The occurrence of spirillosis of fowls in Martinique, SIMOND, AUBERT, and NOC (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 15, pp. 714–716*).—This disease of fowls is said to be epizootic in Martinique during the warm season from May to December and occasionally during other months of the year. The spirochete observed in the blood of fowls in the vicinity of Fort de France is said to be similar to that studied by Marchoux in Rio de Janeiro, and which makes poultry raising in Guiana so difficult. In Martinique as in South America, *Argas miniatus* is the active agent in its transmission. Spirillosis and the loss suffered from the mongoos are said to have made poultry raising nearly impossible in the lower parts of the colony where the disease is much more prevalent than in the mountain section. The author considers it probable that the disease also occurs in Guadalupe.

Human parasitology, M. NEVEU-LEMAIRE (*Précis de Parasitologie Humaine. Paris, 1908, 4. ed., rev. and enl., pp. V+712, figs. 391*).—The first part of this

work (pp. 1–168) is devoted to the vegetable parasites, and the second part (pp. 169–665) to the animal parasites, known to affect man.

An account of some Helminthes contained in Dr. C. M. Wenyon's collection from the Sudan, R. T. Leiper (*Rpt. Wellcome Research Labs. Gordon Mem. Col. Khartoum, 3 (1908), pp. 187–199, pl. 1, figs. 11*).—A genus (Balfouria) and several new species are described in this account.

An echinostoma from the intestine of the dog, A. Railliet and A. Henry (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 11, pp. 447–449*).—The species *Echinostoma gregale* is here described as new. Two other species of the genus have been reported from domestic carnivora and the author considers it very probable that the species here described is a common parasite of the dog and perhaps of the cat.

A disease of rats caused by mites, W. Schürmann (*Centbl. Bakt. [etc.], 1. Abt., Orig., 48 (1908), No. 2, pp. 167–172, figs. 7*).—The author describes a disease of rats which appears to be due to a species of Sarcoptes. The ears, nose, feet, and tail, particularly, are affected.

The hemogregarines of snakes, L. W. Sambon and C. G. Seligmann (*Jour. Trop. Med. and Hyg. [London], 11 (1908), Nos. 23, pp. 355–358; 24, pp. 374–377; 12 (1909), Nos. 2, pp. 22–24; 3, pp. 38–41; 4, pp. 48–55; 5, pp. 70–75, figs. 44*).—The authors have brought together the scattered information concerning hemogregarines in general. The ophidian hemogregarines are considered at length, several species being described as new. A bibliography of 44 titles relating to this subject is appended.

Concerning Trypanosoma pecaudi, T. dimorphon, and T. congolense, A. Laveran (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 13, pp. 818–821*).—Sheep immune to any one of these trypanosomes appear to be susceptible to the other two. Observations here reported confirm the view that the 3 trypanosomes are distinct species.

On the discovery of trypanosomata in an ox in Germany, G. Frank (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 5 (1909), No. 3–4, pp. 313–315; Berlin. Tierärztl. Wchnschr., 25 (1909), No. 11, pp. 214, 215, abs. in Jour. Compar. Path. and Ther., 22 (1909), No. 2, p. 184*).—The trypanosome concerned is said to be a new and different form from any hitherto known.

The transmission of trypanosomes, B. Möllers (*Ztschr. Hyg. u. Infektionskrank., 62 (1909), No. 3, pp. 425–432; abs. in Sleeping Sickness Bur. [London] Bul. 6, pp. 211–213*).—The author considers that 5 of 107 female mice became infected with *Trypanosoma brucei* through copulation and that he has proved the possibility of infection in this way.

In experiments with the young of infected bugs there was no case of conveyance of the trypanosomes. Transmission experiments with descendants of specimens of *Ornithodoros moubata* brought from East Africa by Koch all resulted negatively. Three days after the ticks had fed on infected animals no infection could be produced by the injection of the body contents into mice.

Hematoxic substances secreted by the larvæ of Œstrus, M. Weinberg (*Compt Rend. Soc. Biol. [Paris], 65 (1908), No. 25, pp. 75–77*).—"The larvæ of Œstrus, which fix themselves to a point in the intestinal tract, live on the blood of the host. They suck blood intermittently. The parasites secrete substances which have the property of hindering the coagulation of the blood, of redissolving a clot already formed and of dissolving red corpuscles. The substances are not specific and appear to be reduced, but not destroyed, by heat. They are elaborated by the digestive organs of the larva. They are also found in the adipose tissue and particularly in the red cells of those organs."

Dipping and tick-destroying agents, H. WATKINS-PITCHFORD (*Natal Agr. Jour., 12 (1909), No. 4, pp. 436–459, pls. 2, dgms. 2*).—This is a report of dipping experiments with 14 different products.

Most of the preparations were found to be efficient tick killers, some of them acting efficiently even when used in much higher dilutions than was recommended in the directions. No observations were made as to the species of tick concerned in the test, although the brown tick was the subject of special notice in computing the tick-killing properties of the dipping fluids. No attempt was made to compare the cost of the various preparations, attention having been given entirely to the tick-killing properties and the safety with which applications could be made.

RURAL ECONOMICS.

The problem of farm finance in its relation to permanent agriculture, B. MCFARLAND (*Ann. Rpt. Mo. Bd. Agr., 41 (1908), pp. 110–121*).—The author maintains that the fundamental facts upon which the problem of farm finance rests are the cost and the selling price of farm products; that the cost of farm products is measured and determined by three factors, (1) interest on the investment, (2) labor incidental to growing, harvesting, and marketing the crops, and (3) soil fertility removed by the crops; and that farmers in the United States are not prosperous for the reason that they have to sell their products for less than they cost them.

Taking the average yields and cost per acre of corn, oats, wheat, and timothy, the cost per bushel of grain is shown to be 57 cts., 53 cts., and $1.04, respectively, while a ton of timothy costs the average farmer $11.15 to produce. On the other hand the average prices received by the farmer are 35, 28, and 70 cts., respectively, per bushel for the grain and $7.50 per ton for the hay. In the estimate of the cost is reckoned the loss of potash, phosphoric acid, and nitrogen removed by the crops, which depletes soil fertility, the value of which the average farmer seldom considers. The problem of maintaining our soil fertility, however, is regarded as the paramount problem of agriculture, which can not be made a permanent industry until it is first made profitable.

Among the good results mentioned that would follow the adoption of a system of profitable agriculture would be the rapid increase in the number of farmers, as a large number of wage-workers in the cities would take up farming, resulting in an approach to "that ideal national state of society with a more uniform distribution of population and with the greatest possible number of independent producers of wealth."

Land productivity and the diminishing profits of labor, E. LANGENBECK (*Fühling's Landw. Ztg., 58 (1909), No. 15, pp. 545–555*).—Statistics are presented and discussed as to the factors entering into the cost of producing crops, by which it is shown that a limit is soon reached in the profitable expenditure of capital and labor on land, cultivated extensively or intensively, in the production of farm products.

The productivity of the land is the predominating factor which can not be increased indefinitely even by the application of fertilizers, as the relation between the cost of plant food and the yield of crops, even where the application of the fertilizers has resulted in an increased yield, is measured by the net returns to the farmer. The net returns, however, are shown not to increase proportionately with the increased expenditures of labor and capital, and from this it is argued that capital and labor can not overcome the natural limits of land productivity.

The agricultural labor problem, H. THIEL ET AL. (*Jahrb. Deut. Landw. Gesell., 24 (1909), No. 2, pp. 461–527, dgms. 4*).—These are a series of addresses delivered at the meeting of the German Agricultural Society held June 11, 1909, and dealing with the more important features of the farm labor problem in Germany. Among the topics discussed are farm management and the scarcity of labor, the arbitration of labor disputes, settlements of laborers, the promotion of rural welfare, the rural school problem, rural amusements, and agricultural instruction in rural schools.

The agricultural labor problem in Saxony, B. MOLL (*Die Landarbeiterfrage im Königreich Sachsen. Leipsic, 1908; rev. in Sächs. Landw. Ztschr., 57 (1909), No. 4, pp. 52, 53*).—The defects in the treatment of the agricultural labor problem in the Kingdom of Saxony in the author's book are discussed in this review, with particular reference to the history and statistics, the classification of laborers, the means for relieving the lack of laborers, arbitration commissions, and labor organizations.

An inquiry regarding agricultural small holdings (*Bul. Mens. Off. Renseig. Agr. [Paris], 8 (1909), Nos. 3, pp. 347–351; 4, pp. 468–511; 5, pp. 659–699; 6, pp. 768–806; 7, pp. 929–965*).—This is a series of monographs giving the size, character, value, and other economic data relating to land ownership in France, arranged alphabetically by provinces.

Cooperation in the tenure of small holdings, Mrs. ROLAND WILKINS (*Jour. Bd. Agr. [London], 16 (1909), No. 5, pp. 353–364*).—This article describes the results of cooperation in the process of acquiring and holding land in England under the provisions of the small holdings act of 1907, together with the work of the Agricultural Organization Society in promoting cooperation among small holders and practical illustrations of the success of the movement up to the present time. It is the author's opinion that small holdings will only be successful on the basis of cooperation among the members and that "no pains should be spared to see that the cooperative idea is at the root of every scheme for the further extension of such holdings."

The marketing of agricultural products in England, F. BRINKMANN (*Fühling's Landw. Ztg., 58 (1909), No. 7, pp. 247–261*).—The author traces the development of the various marketing systems in different parts of England for the disposal of wheat, barley, oats, hops, hay, straw, and live stock, as compared with methods of marketing in Scotland, Wales, and Germany, with a discussion of the economic effects on the producer and on the development of agricultural cooperation in England.

It is shown that under the commercial development of Great Britain during the past half century, the purchasing of such products in the markets has resulted in the creation of a class of men who are expert buyers, possessing a knowledge of the markets and quality of the goods which the ordinary producer can not obtain, and that such buyers, in connivance with traders, millers, brewers, butchers, and even with the auctioneers, where goods are sold by auction in certain markets, take advantage of the producers and purchase goods far below their actual value. To secure better returns for their products, the producers have formed cooperative associations, and the character and growth of these societies have been largely determined by the commercial and marketing systems which there prevail for the disposal of staple products.

Establishment and working of the sugar industry agricultural bank at Barbados, J. F. CLARKE (*West Indian Bul., 9 (1908), No. 2, pp. 133–137; Hawaii. Planters' Mo., 28 (1909), No. 7, pp. 266–270*).—The difficulties under which sugar planters labored to secure means for the cultivation of their crops from 1884 to 1907 are described in this article, together with a description of

the organization, control, and operation of the sugar industry agricultural bank and its economic effects on the sugar industry in Barbados.

The development of mutual agricultural fire insurance, CASSEZ (*Semaine Agr. [Paris], 28 (1909), Nos. 1456, pp. 133, 134; 1457, p. 142*).—This is a report presented at the annual meeting of delegates held at Chaumont, April 18, 1909, representing six provinces forming part of the department of the East.

Statistics show that on December 1, 1905, the societies numbered 10, with 325 members and a capital insured of 3,350,000 francs; while on April 1, 1909, the societies numbered 590, with 18,000 members and a capital insured valued at 180,000,000 francs. Other facts and figures bearing on the rapid progress of the mutual fire insurance societies in these provinces are also presented and discussed.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 11 (1909), No. 9, pp. 57–64*).—Statistics on the condition of crops in the United States and foreign countries, the farm values, and range of prices of agricultural products, and the exports of domestic farm and forest products for the years ended June 30, 1908 and 1909, are presented and discussed.

AGRICULTURAL EDUCATION.

Education for country life, W. M. HAYS (*U. S. Dept. Agr., Office Expt. Stas. Circ. 84, pp. 40, figs. 13*).—An address given before the Minnesota Education Association, January 2, 1908.

The circular embodies suggestions for a systematic articulation of the work of agricultural schools of all grades with each other and with the existing system of public schools. It gives special attention to the question of consolidation of rural schools and proposes and illustrates ways and means for such consolidation, while still upholding the one-teacher school in localities where consolidation is not advisable. It also suggests detailed courses of study for the eight-year elementary rural school, for the agricultural high school, and for the college of agriculture. The financing of the agricultural high school and of consolidated rural schools in Minnesota is discussed, the work of the district agricultural schools of Georgia is referred to, and the growing necessity of vocational training for country life shown.

The authority of science, W. H. JORDAN (*In Semi-Centennial Celebration of Michigan State Agricultural College, 1857–1907. Mich. Agr. Col., 1908, pp. 128–145*).—This is the publication in full of an address previously noted (E. S. R., 18, pp. 1004, 1014).

Development of agricultural education, E. E. BROWN (*In Semi-Centennial Celebration of Michigan State Agricultural College, 1857–1907. Mich. Agr. Col., 1908, pp. 103–113*).—This is a publication in full of an address previously noted (E. S. R., 18, p. 1012).

A course in agriculture for the high schools of Michigan (*Mich. Agr. Col., Dept. Agr. Ed. [Pamphlet], 1909, pp. 48*).—Following an introduction designed to show the value and feasibility of an agricultural course in the high school and its educational relation to the other sciences in the curriculum, the pamphlet furnishes syllabi of the work to be done in botany, prepared by W. J. Beal; in farm crops, by F. W. Howe; in entomology, by R. H. Pettit; in soils and farm management, by J. A. Jeffery; in horticulture, by C. P. Halligan; in poultry, by J. G. Halpin; and in dairying and live stock, by A. C. Anderson and R. S. Shaw. These syllabi give lists of laboratory equipment required, with suggestions for teaching, and the pamphlet closes with a bibliography of agricultural reference books and lists of available Michigan Station bulletins and Farmers' Bulletins of this Department.

Course in nature study for elementary grades of Minnesota public schools, FLORENCE E. LILLIE (*Minneapolis, Minn.: Dept. Pub. Instr., 1909, pp. 31*).—This course emphasizes at the outset the view that a nature-study course should not be planned as an introduction to elementary science, or even as a basis for future high-school science and agriculture; "into one or the other it should gradually blend; but that is not its object." The work as planned in this course is carefully classified as to the plants and animals to be studied each term, to avoid uninteresting repetition and the frequently just criticism that nature-study work is "scattering and disconnected." The outline for the higher grades makes free use of The First Book of Farming (E. S. R., 17, p. 96), and a considerable list of other standard agricultural and special texts is included in the last two pages.

Rural continuation schools in Prussia, TRUNZ (*Illus. Landw. Ztg., 29 (1909), No. 44, pp. 430–432*).—An account of the development of rural continuation schools, and a discussion of their courses of study, with particular reference to the amount of agricultural instruction to be included in them.

The theoretical training of practical farmers, P. HERZBERG (*Landw. Wchnschr. Sachsen, 11 (1909), No. 34, pp. 320, 321*).—Brief descriptions are presented of the various classes of German schools giving instruction in agriculture, including the agricultural winter school, the rural continuation school, the farm school, a new school for practical farmers and estate managers established last year at Neuhaldensleben with a course extending through one winter semester, and the agricultural schools.

Farmers' institutes for women, J. HAMILTON (*U. S. Dept. Agr., Office Expt. Stas. Circ. 85, pp. 16*).—A discussion of the importance of farmers' institutes for women is followed by suggestions for organizing such work, including the form of organization for county and state associations, and data concerning the kind of instruction women's institutes should give and the extent to which women's institute work has been developed in the different States.

Programme for technical schools and science and art schools and classes (*Dept. Agr. and Tech. Instr. Ireland [Circ.], 1909, pp. 26*).—This is an explanatory circular, with the regulations for 1909–10 for the administration and distribution of grants to schools other than day secondary schools.

Report of the Royal Institute for Instruction in Viticulture, Pomology, and Horticulture, Geisenheim, J. WORTMANN (*Ber. K. Lehranst. Wien. Obst u. Gartenbau Geisenheim, 1908, pp. IV+212, figs. 17, dgms. 4*).—This is a report on changes in the personnel of the institute, attendance, student excursions, additions to buildings, the library, and the collections of specimens, the technical and scientific work of the institute, the work of the viticultural station at Geisenheim-Eibingen, and extension work.

The progress of agricultural education in the state schools of the Sale (East Gippsland) District, E. R. DAVEY (*Jour. Dept. Agr. Victoria, 7 (1909), No. 8, pp. 533–538, figs. 10*).—Agriculture is now substituted for the science course in 55 of the schools in this inspection district. The instruction is supplemented by a series of experiments in which the child's powers of observation and reasoning are carefully and systematically cultivated. The course embraces the formation and analysis of soils (correlated with physical geography), the nature and value of humus, plant foods and how obtained (osmosis) and their availability at different depths of soil, the water-holding capacity of soils (the necessity for drainage, tillage, and mulching), the progress of plants in dry, drained, and saturated soils, and the growth of plants under varying conditions. School plats are maintained for the testing of varieties of cereals, forage crops, fibers, fruits, and vegetables, and the comparison of crops grown with and without fertilizers.

Elementary agriculture of Tennessee, K. L. Hatch, J. A. Haselwood, and C. A. Keffer (*Chicago, 1909, pp. 185+6, pl. 1, figs. 49, map 1*).—This is a revision, by C. A. Keffer, of Hatch and Haselwood's 1907 edition of Elementary Agriculture (E. S. R., 19, p. 793), in which several chapters have been rewritten and two wholly new chapters have been added to adapt the work to Tennessee conditions. One of the new chapters deals with "The Three Kingdoms" and shows the interdependence of soils, plants, and animals in successful farming operations. The other new chapter is on the agricultural geography of Tennessee and includes a map of the physical divisions of the State. In the chapter on special crops soy beans and truck crops are discussed instead of sugar beets and onions as in the earlier editions.

Weeds, V. H. Davis (*Agr. Col. Ext. Bul. [Ohio State Univ.], 5 (1909), No. 1, pp. 3–14, figs. 11*).—The author describes the most important ways in which weeds lessen farm profits, discusses natural and artificial methods of seed dispersal, and gives a few general principles to be observed in destroying weeds.

Opportunities for instruction in dairy industry at the University Farm, Davis, California, 1909–10 (*California Sta. Circ. 44, pp. 14, figs. 9*).

Announcement of farmers' short courses for 1909 at the University Farm, Davis, California (*California Sta. Circ. 45, pp. 3–20, figs. 9*).

MISCELLANEOUS.

Annual Report of Idaho Station, 1908 (*Idaho Sta. Rpt. 1908, pp. 37*).—This contains the organization list, a financial statement for the fiscal year ended June 30, 1908, a report of the director, and departmental reports, of which that of the irrigationist is abstracted on pages 617 and 629 of this issue.

Twenty-seventh Annual Report of New York State Station, 1908 (*New York State Sta. Rpt. 1908, pp. 552*).—This contains the organization list of the station, a financial statement for the federal funds for the fiscal year ended June 30, 1908, and for the state funds for the fiscal year ended September 30, 1908, reprints of Bulletins 296–302, and 305–310, Technical Bulletins 7 and 8, and Circular 9, all of which have been previously noted, a list of the periodicals received by the station, and meteorological observations noted on page 616 of this issue.

Experiment Station Work, LII (*U. S. Dept. Agr., Farmers' Bul. 366, pp. 32*).—This number contains articles on the following subjects: Treatment of muck soils, manures for timothy hay, corn breeding, yellow berry in wheat, weed seeds in feeding stuffs, hook-worm disease of cattle, effect of machine milking on cows, milk supply of cities, the crow as a menace to poultry raising, and hours of labor, wages, and cost of board in Minnesota.

Books of interest to farmers (*Columbus: Ohio State Library, 1908, pp. 64*).—This comprises a classified list of the 700 agricultural books in the traveling library department of the Ohio State Library, with brief notes on the scope and character of most of these volumes.

Accessions to the Department Library, April–June, 1909 (*U. S. Dept. Agr., Library Bul. 72, pp. 90*).

NOTES.

Alabama College and Station.—R. S. Mackintosh has been granted a year's leave of absence for research in plant breeding at the Iowa College, where he has a fellowship in horticulture and is also acting as instructor in horticulture. M. J. Funchess has been appointed instructor in agriculture in the college and assistant in agronomy in the station.

California University and Station.—The legislature has increased the rate of taxation for the support of the university from two to three cents for each one hundred dollars of assessed valuation. This is expected to provide an income for the current year of about $600,000. Appropriations were also made aggregating $130,000 for additional buildings and equipment at the University Farm at Davis, and $88,500 for its maintenance during the ensuing biennium; $20,000 for farmers' institutes; $15,000 for viticultural investigations; $12,000 for cereal investigations; and about $40,000 for the equipment and maintenance of the Southern California Pathological Laboratory.

A division of agricultural education has been organized, in which Leroy Anderson, professor of dairying and superintendent of the university farm schools, is to have direct charge of secondary instruction in agriculture. E. B. Babcock, assistant professor of agricultural education, will assist in the secondary instruction and have direct charge of elementary instruction in agriculture, the introduction of garden work, and the organization of agricultural clubs. Four new courses are offered for regular and special students in the university on teaching agriculture in high schools, teaching agriculture and nature study in the elementary schools, gardening for prospective teachers, and a special course for students who are preparing to teach the sciences and desire to obtain some preparation in horticulture and agriculture. A circular on suggestions for garden work in California schools has been published and another dealing with agriculture in the high schools is in the hands of the printer.

Howard Phillips has been appointed instructor in animal husbandry at Davis, and L. M. Davis assistant in dairy husbandry.

Colorado College and Station.—E. R. Bennett, assistant in horticulture, has been appointed professor of horticulture and forestry and horticulturist, vice Wendell Paddock, whose resignation has been previously noted. C. L. Fitch has been appointed assistant potato specialist in the station.

Connecticut College.—Charles F. Stephenson has been appointed assistant poultryman.

Connecticut State Station.—Clarence E. Shepard has been appointed chemist, vice Charles A. Brautlecht, resigned. Other appointments include Samuel N. Spring, as forester, and Walter O. Filley, as assistant forester.

Florida University and Station.—As a result of the marked success of the correspondence course for teachers, instituted last year, the university has extended these courses to farmers and their families and others who may be interested. The new courses began November 1, and will be completed June 1, 1910. The subjects covered include elementary agriculture, soils, tillage,

drainage and irrigation, manures and fertilizers, field crops, types and breeds of live stock, dairy husbandry, animal breeding, feeds and feeding, and citrus fruits and citrus culture. There is no age limit or entrance examinations in these courses, and the only expense incurred is for postage and the text-book.

Ground has been broken for the new station building. Alfred Dickinson resigned as gardener October 1.

Idaho University and Station.—Recent appointments include W. H. Wicks as professor of horticulture and horticulturist in the station; F. W. Chamberlain, D. V. M., a graduate of the University of Vermont and the New York Veterinary College, as professor of veterinary medicine and animal husbandry; L. F. Childers, recently connected with the Bureau of Plant Industry of this Department, as agronomist; and G. E. Frevert as assistant in dairying in the station. Prof. J. M. Aldrich has been made consulting entomologist of the station.

Illinois University.—New courses in agriculture extending over two and one-half years are to be introduced into the academy which serves as a preparatory school to the university. In these the first year will be given to a study of field crops and soils, the second to animal husbandry, and the remaining half year to orchard and garden crops. It is planned to make the entire course a demonstration of the feasibility of teaching secondary agriculture in the public schools. It is also expected that these courses will afford a satisfactory means of instructing public-school teachers, who may cover the entire work in one year while also pursuing some studies in the college of agriculture.

Half semester courses in cooking, sewing, and the care and planning of the home are also being offered in the academy, in connection with the department of household science of the university. This department received an appropriation of $2,500 per annum for the ensuing biennium from the last legislature, and is preparing to offer additional university courses dealing with special problems in connection with marketing, the storage of food, and the utilization of waste, and in the economics of the family group.

Purdue University and Station.—Recent appointments include in the college of agriculture H. E. Kiger as instructor in animal husbandry, C. E. Craig as assistant in agronomy, and G. M. Frier as assistant in extension work; and in the station, P. H. Crane as assistant in dairy field work.

Iowa College and Station.—The following are among the recent appointments: W. W. Dimmoch as professor of veterinary medicine and research; I. G. McBeth, of the Bureau of Soils of this Department, as assistant professor of soil bacteriology and experimentalist in soil bacteriology; A. Leitch, a graduate of the Ontario College, as assistant professor of dairying and assistant dairyman; J. H. Gordon, a 1909 graduate of the University of Missouri, as instructor in dairy bacteriology and assistant dairyman; J. R. Campbell as assistant in botany in the college; R. E. Smith, a 1909 graduate of the college, as instructor in soils; and J. W. Merrill, C. R. Bush, and L. E. Troeger as assistants in the extension department. M. L. Bowman, professor of farm crops, has resigned.

Kansas College.—A. B. Nystrom, assistant professor of dairy mechanics at Ohio State University, has been appointed assistant in dairying.

Maryland College.—Cornelius Beatty, formerly chemist at the Oklahoma Station, has been appointed assistant chemist in connection with the state work.

Massachusetts College and Station.—About 200 men applied for admission to the entering class, of whom 131 were admitted, making the total registration for the year 350. This is the largest enrollment in the history of the college, and represents an increase of 100 per cent in the last 6 years.

Work has been commenced on the new building for the entomological and zoological departments.

A field meeting of the State Poultry Association was held at the college October 12 and 13. Addresses were made by President Butterfield and Director Brooks, and by President Creelman, of the Ontario College; demonstrations in poultry anatomy by J. B. Paige; lectures by W. D. Hurd and F. C. Sears, on field and fruit crops in connection with poultry keeping; and an illustrated lecture by J. E. Rice, of Cornell University, on The State and the Poultryman. The meeting was noteworthy as the first gathering of poultrymen ever held at the college.

Dr. H. J. Franklin, of the Minnesota University and Station, has been appointed assistant entomologist, and began work October 1 in charge of the cranberry investigations. P. B. Goldsmith, assistant in chemistry in the station, has resigned to take effect December 1.

Minnesota College and Station.—New buildings have been completed for the poultry and veterinary divisions, extensive repairs have been made on the boys' dormitory, and plans have been approved for the girls' dormitory, recently authorized.

A farm has been leased for five years to carry on experiments in quack grass eradication. The Grand Rapids Substation is conducting, in cooperation with the Wisconsin Station, experiments as to methods and cost of stump removal from cut-over lands.

Ralph Hoagland has been appointed professor of agricultural chemistry, vice Harry Snyder, whose resignation from this position has been previously noted.

Missouri University and Station.—Among the recent changes in staff are the following: E. A. Trowbridge, promoted from instructor to assistant professor of animal husbandry; Fred S. Putney, appointed assistant to the dean and director, vice John M. Evvard, who has been appointed assistant in animal husbandry, vice H. P. Rusk, resigned; and R. E. Hundertmark and E. W. Rusk, 1909 graduates of the University of Missouri and the Ohio State University, respectively, appointed assistants in animal husbandry.

Nebraska University and Station.—Registration under the new form of organization, whereby the agricultural work is separated from that of engineering, shows an enrollment in the college of agriculture of 125 students in the four-year course, 88 in the summer school, and 340 in the school of agriculture, making the total to date 553 students.

A temporary building is being added for the use of the department of farm mechanics, which will practically double the floor space available for instruction in farm machinery. The department of animal husbandry has recently purchased, under an appropriation of $2,500, a herd of Shorthorn and Hereford cattle for use in instruction work.

G. Herbert Coons has been appointed adjunct professor of agricultural botany, vice R. E. Stone, whose resignation has been previously noted. Karl A. Ulmann, a 1909 graduate of the university, has been appointed instructor in dairy husbandry.

New Jersey College Station.—Nahum D. Shore, assistant in plant breeding since 1906, died September 20, at the age of 28 years. Mr. Shore was graduated from the Baron de Hirsch School in 1901 and from Rutgers College in 1906, receiving the master's degree from the latter institution in 1908. He had given special attention to plant breeding and histology, and to plant physiology.

Henry L. Janeway, a member of the board of control since 1902, died October 18.

New Hampshire College and Station.—E. D. Sanderson, director of the station for the past two years, has resigned to take effect January 1, 1910. L. A. Pratt, a 1909 graduate of the college, has been appointed instructor in chemistry, and T. G. Bunting, a 1907 graduate of the Ontario College, instructor in horticulture.

New York State Station.—W. J. Young, student assistant in horticulture, has returned to the Bureau of Chemistry, of this Department.

Ohio State University.—W. C. Lasseter, a 1909 graduate of the University of Wisconsin, has been appointed assistant in soil physics.

Oklahoma College and Station.—Albert Stocker, a 1909 graduate of the University of Wisconsin, has been appointed assistant professor of dairy husbandry. It is announced that the previous note regarding O. M. Morris and G. M. MacNider (E. S. R., 21, p. 195) was incorrect, the former retaining the position of horticulturist and botanist and no appointment having been made to the position of assistant chemist.

Oregon College and Station.—The main section of the new agricultural hall is in process of construction. This portion will be 150 by 175 ft., with four stories and basement. The basement is to be of concrete, and the superstructure of brick with stone trimmings.

Mrs. Laura Hill Griffin has resigned as assistant entomologist, and has been succeeded by Miss Alice L. Edwards, a 1906 graduate of the college. W. L. Powers, who recently received the M. S. degree at the New Mexico College, has been appointed assistant agronomist, and will give special attention to irrigation problems. James Koeber, a 1909 graduate of the college, has been appointed assistant in agronomy.

Pennsylvania College.—A department of agricultural education has been established to assist in the work of introducing agriculture into the public schools and to take charge of the correspondence courses in the college. In this connection it is proposed to outline reading courses and probably to establish correspondence courses for teachers. T. I. Mairs, who has had charge of the correspondence courses for several years, is at the head of the new department.

Porto Rico College and Station.—The establishment of an agricultural college has been authorized by the territorial legislature, and J. W. Hart, of the Louis Queiros School of Agriculture, at Piracicaba, São Paulo, Brazil, has been elected president. The college is to be located at Mayaguez, where land has been acquired, some of which adjoins the station. It is hoped to begin the erection of buildings on this tract in the near future. The board of trustees includes D. W. May, special agent in charge of the station.

South Dakota Station.—H. B. Potter, W. D. Griggs, S. Garver, and P. H. Moore have been appointed assistants in agronomy, B. L. Thompson, assistant in animal husbandry, and Orland White, assistant in botany.

Texas College and Station.—According to press reports, 50 more tents have been purchased to add to the 85 already in use on the campus for the accommodation of students. It appears that there are more than 200 students who can not be accommodated in the dormitories.

Don T. Griswold has been appointed instructor in animal husbandry in the college and assistant animal husbandman in the station. J. B. Rather has been transferred from the feed control work to the investigations under the Adams Act.

Washington College.—F. B. Hadley, assistant professor of anatomy and surgery, has accepted a similar position at the Ohio State University. K. A. Kirkpatrick has been appointed instructor in horticulture.

Wisconsin University and Station.—A department of home economics has been established in the college of agriculture in charge of Miss Abby L. Marlatt, with Misses Alice Loomis and Leona Hope as assistants. The initial registration in the courses offered is over 100, of whom 54 are in the four-year course and several are graduate students.

Other appointments include E. E. Eldridge, a 1909 graduate of the college of agriculture, as assistant in bacteriology, and Llewellyn R. Davies as assist-

ant in dairy tests and fertilizer and feed inspection, vice Roy T. Harris, resigned to engage in commercial work.

New Experiment Station in Argentina.—The government of the province of Tucuman, Argentina, has recently established an agricultural experiment station near the city of Tucuman. R. E. Blouin, formerly assistant director of the Louisiana Sugar Station, has accepted the directorship of the new station, and Dr. Fritz Zerban, formerly chemist of Louisiana Sugar Station and more recently director of the Sugar Experiment Station, at Lima, Peru, is to be subdirector.

Entomological Research in Africa.—The *London Times* announces the appointment by Lord Crewe of a scientific committee of 20, to be known as the African Entomological Research Committee, the object of which will be to further the study of economic entomology, with special reference to Africa. Lord Cromer has consented to act as chairman and Guy A. K. Marshall as scientific secretary.

Arrangements are being made to send trained entomologists to the east and west sides of tropical Africa, respectively, to stimulate interest in entomological work among the officers and other residents of the regions, and to afford instruction in the use of scientific methods. It is hoped thereby to obtain an organized body of investigators. The committee will also keep in touch with work already under way, and has received offers of cooperation from the British Museum, the London and Liverpool Schools of Tropical Medicine, and the leading English universities. It is planned to publish observations and other scientific results in a journal or series of bulletins to be established.

The Biltmore Forest School.—A note in *Conservation* states that the Biltmore Forest School, Biltmore, N. C., was to close November 1, when Dr. C. A. Schenck, who has been superintendent of the school for about 15 years, was to sever his relations with the Biltmore estate. Some 25 of his students have signified their intention of continuing their work under his direction and will accompany him to Germany. A new school under his management is to be organized, to retain the name of the Biltmore Forest School, but instead of having a single fixed location it will carry on work over a wide range of forests. The principal headquarters will be in Germany near the Black Forest, where the school will be located for about 6 months each year. For the rest of the year practical work in the forests of Maine, Wisconsin, and eastern Tennessee is contemplated.

Agriculture in the University of The Philippines.—A college of agriculture was opened at Los Banos, June 14, with about 60 students in attendance. E. B. Copeland is dean and professor of agriculture, Harold Cuzner, professor of agronomy, Edgar M. Ledyard, professor of zoology, and S. B. Durham, professor of animal husbandry.

Agricultural Course at the University of Manchester.—This university has decided to establish a three-year course in agriculture leading to a degree in science. The first year will, as a rule, be taken entirely at the university, while the second and third years will be given partly at the university and partly at the College of Agriculture of the Cheshire County Council at Holmes Chapel.

Agricultural Course at Lenox College.—A recent number of *Wallace's Farmer* states that a four-year course, dealing with animal husbandry, farm crops, soil research, and rural citizenship, has been established at Lenox College, Hopkinton, Iowa. The course is open to all farmers' sons, and does not require a preparatory high-school training. C. N. Evans, a postgraduate student of the Iowa State College, has been given charge of the new course.

A New Polytechnic Institute with Agricultural Courses.—The Billings Polytechnic Institute was opened at Billings, Mont., the first week in October, occupying temporary quarters pending the completion of 7 buildings which are in

process of construction. The institute is a secondary school, offering courses related to the industries of the region, among which is a 4-year course in agriculture. The officers of the corporation include John D. Losecamp as president and Lewis T. Eaton as educational director.

New York State School of Agriculture.—The New York State School of Agriculture at Alfred University has just issued its first annual announcement. A novel feature is the arrangement of its 3-year course of study (6 months each year) under three heads, viz, for boys, for boys and girls, and for girls. The work under the first and third headings is almost evenly balanced in time units, and among the technical studies common to groups 1 and 2 are general agriculture, general and agricultural botany, farm law and accounts, rural sociology, butter, cheese, poultry, plant diseases, general and landscape gardening, and insect pests. Besides English, arithmetic, history, and hygiene, careful attention is also given to physical culture, music, parliamentary practice, and social life.

Secondary Instruction in Agriculture.—The Genesee Wesleyan Seminary, at Lima, N. Y., has established departments of agriculture and domestic economy, and is offering courses in these subjects for the first time. This institution is one of the oldest college preparatory schools in western New York, having been established in 1829 and opened in May, 1832. During all of this time it has confined its work almost entirely to classical and Latin-scientific courses, but more recently it has established an engineering preparatory course, a course in commerce, and a seminary course, and now it purposes developing courses of instruction more closely related to the lives and interests of the people in its vicinity.

The agricultural equipment includes 80 acres of land, about 60 of which will be available for gardening, fruit growing and general agriculture, a small herd of dairy cows, work horses, and poultry. F. E. Robertson, a 1909 graduate of Cornell University, has been appointed professor of agriculture, and has been spending the summer repairing the farm buildings. Poultry houses are to be erected and up-to-date farm machinery and implements installed.

An agricultural high school has been provided for at Sparks Station (P. O. Philopolis), Baltimore Co., Md., with B. H. Crocheron, a graduate of Cornell University, as principal and teacher of agriculture. A new building is being erected and will soon be ready for occupancy. Mr. Crocheron will also supervise instruction in agriculture in the public schools of Baltimore County.

Under a recent act of the Maine legislature, which provides that any incorporated academy in the State maintaining a course in manual training, domestic science, or agriculture, approved by the state superintendent of schools, shall be entitled to receive annually from the State a sum equal to the amount expended for such instruction up to $250 for each course, an agricultural high school course has been adopted in Leavitt Institute at Turner Center, Me. The course extends through four years and includes the ordinary academic subjects in addition to a full line of agricultural instruction of secondary grade. A rather unusual feature of the course as reported is the application of chemistry "to agriculture, the study of soils, plant life, and fertilizers" in the first year.

In addition to the 2 district agricultural schools already established at Tishomingo and Warner, the Oklahoma legislature has authorized the establishment of similar schools, to be located during the year 1909, in the third, fourth, and fifth supreme court judicial districts. Sixty thousand dollars is appropriated for the erection of buildings in these 3 districts, with $12,000 each for their maintenance in 1910, and $17,000 each for the year ending June 30, 1911. A later act approved March 11, 1909, divides the fifth district

into two parts and provides for the establishment of a school to be known as the Panhandle Agricultural Institute for the counties of Cimarron, Texas, and Beaver. This school also is to be located before 1910, on 80 acres of land deeded to the State, and like the rest will be governed by the State Commission of Agricultural and Industrial Education. There is appropriated $12,000 for the erection of buildings, $5,000 for maintenance in 1910 and $7,000 for 1911.

An announcement has been received of the courses in agriculture, manual training, and domestic science to be inaugurated this year in the public schools of Glencoe, Minn., under the provisions of the Putnam Act, giving State funds not to exceed $2,500 a year upon condition that half that amount be expended by the local school authorities for the support of instruction along these lines. The work in agriculture provided for in this announcement includes instruction in soils, farm crops, horticulture, animal husbandry, and dairying, this work to be given in a short course of 5 months beginning November 1. The work in manual training will be accessory to that in agriculture, and will include the drawing of plans for useful farm implements and structures, elementary work in iron, and carpentry. The high school also purposes doing extension work in farmers' institutes, testing seeds, milk, and other agricultural products, furnishing information useful to farmers, and performing other services similar to the extension work of the county agricultural schools in Wisconsin and Michigan.

The La Crosse County School of Agriculture and Domestic Economy at Onalaska, Wis., opened to students October 11, with an enrollment of 71 boys and 61 girls. A new two-story brick building, with a high basement and connected greenhouse, has been erected on the 17-acre farm which this school will utilize for instruction and demonstration purposes. The 2-year course is similar to that in the other county agricultural high schools, except that it includes military drill for men. A. A. Johnson is principal of the school, Miss Lucile W. Reynolds, teacher of domestic economy, and P. L. Johnsrud, teacher of agricultural engineering and manual training.

Secondary and Elementary Agriculture in Texas.—The legislature of Texas at its last session appropriated $6,000 a year for two years to the State normal schools located respectively at Huntsville, Denton, and San Marcos for the purpose of installing, equipping, and maintaining departments of agriculture, manual training, and domestic science, and provided that instruction in these subjects shall begin not later than the autumn of 1909. The act also made provision for the introduction of teachers' courses in elementary agriculture in the summer sessions of these 3 normal schools, the College of Industrial Arts for Girls, at Denton, and in summer sessions at the Agricultural and Mechanical College and the State University. For the support of this work $3,000 annually was appropriated to be divided equally among the 6 institutions.

There was a further appropriation of $32,000 to provide a fund from which the State Board is to duplicate amounts not less than $500 nor more than $2,000, that shall have been appropriated by the trustees of any common school district or independent school district to the establishing, equipping, and maintaining of departments of instruction in agriculture, including courses in manual training and domestic economy "subsidiary to agriculture." State aid shall not, however, be given more than twice to the same school and the geographical location of the school shall be considered with a view of locating such a school if possible in each of the senatorial districts of the State. Unlike many of the acts intended to promote instruction in agriculture, this one makes it obligatory on the part of the school board to provide laboratories for instruction in botany, zoology, and other elementary sciences related to agriculture, and land for the

production of farm and garden plants and to employ a teacher who has received special training in agriculture and allied branches.

Jewish Agricultural Scholarships.—The *Jewish Farmer* for September announces the establishment of 12 scholarships for sons and daughters of Jewish farmers, by the Jewish Agricultural and Industrial Aid Society. These scholarships are open to successful contestants in the writing of short essays in English of not more than 500 words, and provide free tuition in the short winter courses of any state agricultural college, together with all other expenses except railroad fare.

Associations of Teachers of Agriculture.—The *Nebraska Farmer* announces the organization of a society for promoting the interest and preparation of teachers in school agriculture in the Nebraska State Normal School. The plan contemplates the formation of local subsidiary chapters of the society wherever 10 or more teachers become interested, and the hope is entertained that the parent organization may thus become a working "pedagogical laboratory for testing and discovering methods to improve and extend the teaching of agriculture throughout the schools of Nebraska." The central society will have an annual meeting in connection with the State Fair at Lincoln, where lectures will be given in the various barns and halls by prominent agricultural leaders "in the presence of actual results exhibited by practical farmers."

According to the *School News and Practical Educator* (Chicago), 27 high-school teachers attending the summer school of the University of Illinois, have organized the Illinois Association of Teachers of Agriculture. It contemplates the circulation to members of edited and mimeographed reports of the work each is doing from month to month. The president is A. C. Norris, instructor in physics and chemistry in the Rockford (Ill.) High School. There is no expense connected with membership and it is open to all teachers interested.

Fourth National Dairy Show.—The Fourth National Dairy Show was held October 14–24, at the Auditorium in Milwaukee, Wis. The show was opened by President Taft and Governor Davidson, of Wisconsin, the former setting the machinery in motion by telegraph, and the latter serving as presiding officer on the opening night. The attendance was exceptionally good throughout, this being attributed in part to the marked local interest in the show, the daily press devoting much attention to the enterprise.

In the way of educational exhibits the show was particularly strong. One of the most noticeable features was a working dairy of 16 grade cows, shown by the Dairy Division of this Department. Complete records were posted each day as to the cost of food and net profits for the different animals, as a demonstration of the value of keeping records; and there were comparative trials of different methods of feeding. The Dairy Division also showed photographs of modern dairy equipment, barn plans, and other illustrative material relating especially to the care of milk on the farm and in the home. The University of Wisconsin, the Pennsylvania State College, and the Minnesota Dairy and Food Department also had educational displays. The agricultural colleges and this Department contributed numerous speakers to the various conventions held in connection with the show, and in the stock judging contest. Director Hayward, of the Delaware Station, served as judge in the Ayrshire class.

The fourth annual conference of the Official Dairy Instructors' Association was attended by about 40 members, representing all parts of the country. The committee on dairy score cards reported that the card adopted by the association at its last meeting is now in actual use in 128 cities, and that 110 others have the card under consideration. Reports were also given by the

standing committees on official testing of dairy cows, relations to the National Dairy Show, courses of instruction, experimental work in milk production and dairy manufactures, standards for dairy products, official methods of testing dairy products, extension work, judging dairy cattle, and cow test associations. The officers of the previous year were reelected, as follows: C. H. Eckles, president, H. E. Van Norman, vice-president, and C. B. Lane, secretary-treasurer.

The intercollegiate students' judging contest of dairy cattle was under the supervision of Chief Rawl, of the Dairy Division, and was participated in by teams from 7 institutions. The $300 sweepstakes trophy and the trophy for highest individual score were won by students from the University of Nebraska, followed in order by the teams from Cornell, the universities of Missouri and Minnesota, the Iowa and Pennsylvania colleges, and the Ohio State University. The breed trophies were awarded to the Ohio State University team for Ayrshires, to that of Missouri for Dutch Belted cattle, to Minnesota for Guernseys, to Nebraska for Holsteins, and to Cornell for Jerseys.

Fourth International Dairy Congress.—An account has recently been received as to this congress, which was held at Budapest June 6–11.

The congress was opened by the patron, Archduke Joseph, with over one thousand delegates in attendance. As in previous years, it was organized in three sections, namely, rules and ordinances, hygiene and veterinary science, and dairy industry. The programme also included many excursions to typical dairy farms and milk depots, and there was an extensive exhibit of dairy products and machinery. The next congress is to be held at Stockholm, in 1911.

Entomological Meetings at Boston.—In connection with the Boston meeting of the American Association for the Advancement of Science and its affiliated societies, the American Association of Economic Entomologists will hold its twenty-second annual meeting December 28 and 29. The Association of Horticultural Inspectors will meet December 27, and the Entomological Society of Amercia December 30 and 31. It is expected that there will be an extensive exhibit of New England insect fauna, together with a special display of equipment and devices for rearing and distributing beneficial species, as well as for treating noxious species in the field.

Miscellaneous.—The death is announced in *Nature* of Prof. J. Scott, author of various text-books on farm engineering, and formerly professor of agriculture and rural economy at the Royal Agricultural College, Cirencester.

The *Illustrierte Landwirtschaftliche Zeitung* of May 1 gives brief descriptions of the Agricultural and Dairy Institute, Alnarp, the People's High School at Hvilan, and the Seed Breeding Station, Svalöf, with a statement of their influence on Swedish agriculture.

Illustrierte Landwirtschaftliche Zeitung for June 12 contains an illustrated description of the buildings and equipment of the Agricultural Institute of the University of Leipsic.

The March–April number of *L'Agricoltura Coloniale* contains an illustrated account of the Italian Colonial Institute of Agriculture, with a description of the lines of work.

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NOTE.—The publications of the United States Department of Agriculture may be purchased from the Superintendent of Documents, Washington, D. C., to whom all remittances should be made. The price of *Experiment Station Record* is $1 per volume, and there will be two volumes each year. The prices of other technical publications are given above. The publications of the State experiment stations are distributed from the stations and not from the Department.

[a] Not to be confused with Bul. 109, Aug., 1908, previously noted (E. S. R., 20, p. 510).

EXPERIMENT STATION RECORD.

VOL. XXI. ABSTRACT NUMBER. No. 8.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Enzyms and antienzyms, A. J. J. VANDEVELDE (*Chem. Weekbl., 6 (1909), No. 19, pp. 327–337*).—The author investigated the influence of heat upon the proteolytic enzyms of milk and serums from various sources, with particular reference to antiproteolysis.

For this purpose centrifuged cow's milk, bovine blood serum, and horse blood serum were heated at temperatures of 45, 55, and 65° C. for 30 minutes, respectively. The amount of proteolysis was determined by estimating the amount of protein which was precipitated before and after a period of 410 days with 92 per cent alcohol.

Percentage of proteolysis in milk and different serums at various temperatures.

Kind of material.	Room temperature.	45° C.	55° C.	65° C.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Raw milk	33	36	50	52
Milk and horse serum	11	15	29	26
Bovine serum and milk	20	17	17	17
Unheated milk and heated bovine serum	17	16	17	19
Heated milk and unheated horse serum	17	17	19	22
Unheated cow's milk and heated bovine serum	20	20	21	12
Heated bovine serum and heated milk	20	17	14	9

From the above results it appears that the presence of bovine serum in milk brings about a diminution of proteolysis and indicates the presence of antienzyms. The presence of horse serum, however, shows no antienzymic action. A theory as to the results obtained is given.

The maltase of buckwheat, J. HUERRE (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 23, pp. 1526–1528; abs. in Chem. Zentbl., 1909, II, No. 3, p. 227*).—Buckwheat contains an under-maltase which has a range of activity between +3 and +70° C. with the optimum at 55°. This activity is reduced by partial neutralization with alkalis, or on addition of amino acids and acetamid. The I-maltase exists only in the dried seeds or possibly at the beginning of germination, but decomposes quickly as the germinating process goes on.

The determination of nitrogen by the Kjeldahl method, particularly in milk, G. WIEGNER (*Jour. Landw., 57 (1909), No. 1, pp. 81–110, figs. 3*).—The

various factors which influence the results in nitrogen determinations in general, and especially those in milk analysis, are discussed very completely. Special stress is laid on the error due to the nondecomposition of the volatile fatty acids, the adhering of these bodies to the sides of the oxidizing flask, and their final transmission into the distillate. The author prefers using copper sulphate instead of mercury, which gives low results in milk analysis. Sodium hydroxid is discarded in favor of potassium hydroxid, as the latter solution boils more freely, very seldom bumps, and does not necessitate the addition of zinc.

The method proposed is as follows: Weigh off 10 gm., or thereabouts, of milk in a flask and heat with 25 cc. sulphuric acid. When the frothing ceases, add 10 gm. of potassium sulphate, and oxidize until no color is present. Dilute the solution with 50 cc. of water and filter through a hardened filter paper to remove any unoxidized fatty acids. After this add just so much 60 per cent potassium hydroxid as will neutralize the acid, allow the mixture to cool, and then add the remainder of the alkali, which in all is about 175 cc. Finally add 100 cc. of 17.5 per cent potassium sulphid solution.

For the distilling process the author describes a new apparatus, in which the distillation is carried out in about 45 minutes. The distillate is collected in 60 cc. of decinormal sulphuric acid, and subsequently accurately diluted to 250 cc. The nitrogen is estimated by adding 15 cc. of a 10 per cent potassium iodid solution and 15 cc. of 4 per cent potassium iodate solution, closing the flask with a ground glass stopper, allowing it to stand for 45 minutes, and titrating back the iodin with decinormal thiosulphate solution.

The determination of nitric acid with nitron, C. Paal and A. Ganghofer (*Ztschr. Analyt. Chem., 48 (1909), No. 9, pp. 545–555*).—This is a verification of Paal and Mehrtens' work (E. S. R., 18, p. 525) on the accuracy of the method for the determination of nitrates in meat. The method is also found efficient for solutions which contain dextrin, peptone, or gelatin.

Detection of nitrates in the presence of bromids, Villedieu (*Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 2, pp. 66, 67; abs. in Analyst, 34 (1909), No. 402, pp. 418, 419*).—Although the coloration produced by nitrates with sulphuric acid and ferrous sulphate is masked by the color of the iron bromid if a bromid is present, good results can be obtained even with solutions containing a small amount of nitrate and much bromid by neutralizing the liquid, shaking it with an excess of basic lead acetate, and allowing it to stand. The upper liquid is then decanted and filtered. To the filtrate an amount of sodium sulphate is added sufficient to precipitate all lead present, and this is then again filtered. If 1 cc. of the filtrate is mixed with 1 cc. of sulphuric acid and 1 drop of a reagent prepared by mixing sulphuric acid with a very small quantity of ferrous sulphate, even minute quantities of nitrates give a reddish-brown coloration.

Contributions to the micro-chemical analysis of the alkaline earth metals. N. Schoorl (*Ztschr. Analyt. Chem., 48 (1909), No. 7–8, pp. 401–415*).—Many general and special micro-chemical methods are described for barium, strontium, and calcium.

A new titrametric method for the determination of barium. E. A. Hill and W. H. Zink (*Abs. in Chem. Ztg., 33 (1909), No. 70, Repert., p. 305*).—The method is based upon the precipitation of barium as an iodate and the reaction of this substance on iodide of potash solutions of known strength. Sodium, potassium, magnesium, and ammonium salts present in slight amounts do not influence the reaction, but this is not the case with calcium and strontium.

The estimation of lead in tin vessels. F. Knöpfle (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 11, p. 670*).—Methods such as Busse's do not yield

correct results when the tin-lead composition contains much iron. The author proposes a method which gives better results.

A new micro-chemical reaction for arsenic and phosphorus, DENIGÈS (*Österr. Chem. Ztg., 12 (1909), No. 16, p. 208*).—With this test the author was able to detect quickly and in the cold 1/1000 mg. of arsenic and phosphorus. The reagents employed were either ammoniacal or acetated silver nitrate solution or mercuric nitrate and magnesium mixture. The arsenic is obtained in the form of rods or plates. The phosphorus is transformed into phosphoric acid and collected with the condensed water in a Blondlot and Dusart apparatus.

Qualitative test and quantitative approximation of small amounts of arsenic, R. BENSEMANN (*Ztschr. Angew. Chem., 22 (1909), No. 37, pp. 1804–1806*).—A Julius and Robert Otto hydrogen generation apparatus has been modified by the author for arsenic work. For the quantitative approximation analysis he proposes a series of mirrors prepared from known amounts of arsenic.

The estimation of the citrate soluble phosphoric acid in Thomas slag powder, SOXHLET (*Landw. Vers. Stat., 71 (1909), No. 1–3, pp. 220–224*).—The Association of Agricultural Experiment Stations of Germany has adopted the following methods for the estimation of citrate soluble phosphoric acid in Thomas slag powder: (1) The hydrochloric method with the elimination of silicic acid; (2) the direct precipitation according to Böttcher-Wagner in conjunction with the Kellner preliminary test; (3) the method of Naumann; (4) the Darmstadt method; and (5) the Lorenz method. The permissible limit established for error is 0.3 per cent.

The determination of potash in potassium fertilizers, SOXHLET (*Landw. Vers. Stat., 71 (1909), No. 1–3, pp. 181–205*).—This is a criticism of the various methods employed in the determination of potash in potassium salts for fertilizers by the Association of Agricultural Experiment Stations of the German Empire.

A reaction of acid soils, O. LOEW (*Ztschr. Landw. Versuchsw. Osterr., 12 (1909), No. 5, pp. 461–463; abs. in Chem. Abs., 3 (1909), No. 19, p. 2337*).—The following method for detecting acidity is given: Boil 10 gm. of the soil with 10 cc. of 1 per cent potassium iodid 5 to 10 minutes in a water bath, add a few drops of potassium nitrate and starch paste, and cool quickly.

The detection of free CO_2 in water, L. BITTER (*Hyg. Rundschau, 19 (1909), No. 11, pp. 633, 634; abs. in Chem. Zentbl., 1909, II, No. 1, p. 63*).—Attention is called to the fact that too much reliance must not be placed in the rosolic acid reaction. It is better to take 50 cc. of water and 10 drops of an alcoholic solution of phenolphthalein in a 200 cc. Erlenmeyer flask and if a red coloration does not ensue to shake the water strongly for 10 minutes or boil it for a time. If a pink color manifests itself, free CO_2 is present. For its quantitative determination Trillich's titration method is recommended.

The legal coloring matters for foods and the difficulties of their preparation, G. KOHNSTAMM (*Österr. Chem. Ztg., 12 (1909), No. 15, p. 194*).—Of 189 colors examined, it was found that the poorest grade of colors was that generally employed to color foodstuffs.

All of the 60 samples of Naphthol yellow S examined contained martius yellow, many had from 2 to 33 per cent of the original synthetizing bodies and decomposition products present, and 41 contained arsenic, 29 in large quantities. With Orange I, out of 28 samples investigated all contained products of decomposition, most contained free naphthol and lead, and some contained iron. Among 38 Amaranth samples, all contained arsenic and other coloring matters; iron was also found. In 10 of the 12 Erythrosin samples examined there was

no erythrosin whatever, but arsenic was present. The 2 remaining samples had too little iodin. Among the Fuchsin S yellow-light-green samples only 1 was free from arsenic and 9 contained lead or copper. Of the 8 samples of indigo disulphonic acid not 1 was pure. Ponceau 3 R was the purest of all the coloring matters examined.

Salicylic acid as a preservative from the newer legal standpoint, R. RACINE (*Ztschr. Öffentl. Chem., 15 (1909), No. 12, pp. 221–224*).—A discussion of the legal use of salicylic acid in various foods and beverages, with some general remarks upon its action on the human organism.

Methods for the determination of salicylates, A. SEIDELL (*Jour. Amer. Chem. Soc., 31 (1909), No. 10, pp. 1168–1177*).—A critical study of existing methods for the determination of the salicylate radical in the salicylates.

The detection of preservatives in meat, W. WARA (*Ztschr. Fleisch u. Milchhyg., 19 (1909), No. 11, pp. 384–387*).—This is a compilation of the usual methods for the detection of boric, salicylic, and sulphurous acids, saltpeter, formaldehyde, and hydrogen sulphid in meats, so simplified that very little chemical knowledge or equipment is required for their use. A method for the approximation of the glycogen content is also given.

The amount of sulphurous acid in gelatin, W. LANGE (*Arb. K. Gsndhtsamt., 32 (1909), No. 1, pp. 144–157*).—White and red gelatin from different manufacturers, gelatin powders, and gelatin for clarifying wines were found to contain from 0.016 to 0.467 per cent of sulphurous acid. The capsules had a maximum of 0.026 per cent and a minimum of 0.014 per cent (6 samples). The results indicate that sulphurous acid is generally employed in the manufacture of gelatin.

The determination of fat in hog products, G. PERRIER (*Bul. Soc. Chim. France, 4. ser., 5–6 (1909), No. 10, pp. 569–571; abs. in Chem. Zentbl., 1909, II, No. 2, p. 152*).—By this method the fat is obtained in unchanged form in about 3 hours.

A 10-gm. sample of the product (liver paste, bologna, etc.) is rubbed up in water with 3 to 4 gm. of washed and dried sand and 20 to 25 gm. or more of water-free sodium sulphate until the mass is powdered and does not adhere to the sides of the mortar. This is allowed to stand for one-half hour, packed into an extraction thimble and extracted with ether for 2 hours. The residue obtained from the extraction is dried at 110° C., or in a vacuum over sulphuric acid at ordinary temperature.

Detection of patent roller flour in bread, C. GRIEBEL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 11, pp. 657–661, figs. 7*).—Patent roller flour is a flour prepared from steamed potatoes, which is supposed to increase the baking quality of poor rye or wheat flour. The author was able with potassium hydroxid and chloral hydrate to differentiate the various cellular elements of the potato, the cork tissue of the peel, the vascular elements, etc., both in the flour and the baked bread. Solanin could be detected chemically only in the flour.

Some further contributions to the knowledge of artificial honey, A. JÄCKER-SCHMID (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 11, pp. 671, 672*).—By distilling off the volatile products of artificial honey the author was able to verify the presence of furfurol with anilin acetate. Pure honey did not give this reaction. Some spectroscopic investigations were also made.

[Some further contributions regarding Fiehe's reaction], K. KEISER (*Arb. K. Gsndhtsamt., 30 (1909), No. 3, pp. 637–657*).—The author was able to verify some of Fiehe's conclusions and found that honeys which had 8 to 10 per cent of invert sugar, 20 per cent of artificial honey, and 40 per cent of glucose respectively gave a very definite reaction. In studying the different products

obtained by the different methods of inversion of sugar it was found that yeast invertase did not produce products which give this reaction. When pure honey was heated to 120° C. or heated for 1 hour at 100°, the Fiehe reaction was obtained. Pure honey heated at 60° for 2 hours gave a very slight reaction, though pronounced. The reaction is probably produced by the formation of β-Oxy-S-methyl-furfurol. Attention is drawn to the fact that during the production of clarified honey long heating is avoided as it tends to diminish the quality of the article, but that it is possible to distinguish the difference between a honey which has been overheated and one which is adulterated.

Fiehe's reaction and that of Ley and Jägerschmid, W. BREMER and F. SPONNAGEL (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 11, pp. 664–667*).—The authors obtained Fiehe's reaction with honey of undoubted purity. In some instances it was obtained in the cold, while with others it was apparent only after heating in the water bath. It is also reported that a honey which was declared to be artificial gave Fiehe's reaction only after heating for some time in the water bath. With Ley and Jägerschmid's method only 7 out of 9 natural honeys could be identified. The reaction, therefore, is not deemed altogether reliable.

The detection of mineral acids in vinegar, F. UTZ (*Österr. Chem. Ztg., 11 (1908), No. 24, pp. 326–328; abs. in Ztschr. Analyt. Chem., 48 (1909), No. 6, p. 389*).—Fiehe's invert sugar reaction (E. S. R., 20, p. 612) was used, 4 to 5 gm. of cane sugar in 10 cc. of the vinegar being inverted in the water bath, the solution cooled, and extracted 2 or 3 times with ether, the ethereal extract evaporated, and the residue treated with resorcin-hydrochloric acid. Even with very small amounts of mineral acid present a rose-red color appears which rapidly changes to a cherry red.

The detection of inosit in natural wines, G. PERRIN (*Ann. Chim. Analyt., 14 (1909), No. 5, pp. 182, 183; abs. in Analyst, 34 (1909), No. 400, p. 324*).—To 200 cc. of wine are added 20 cc. of basic lead acetate and a few drops of an alcoholic solution of tannin. The filtrate is freed from lead with hydrogen sulphid, decolorized with charcoal, and concentrated to a bulk of 200 cc. on the water bath. Two drops of this concentrated solution are heated on a platinum foil with 1 drop of a 10 per cent solution of silver nitrate and finally cautiously ignited. Inosit gives a red-violet coloration which disappears on cooling. Two more drops are then heated on another platinum foil with 1 drop of nitric acid, ignited as before, the residue treated with 1 drop of ammonia, and again evaporated. A color less red than that obtained with silver nitrate indicates that the wine contains inosit.

The presence of inosit as a characteristic of natural wines, G. MEILLÈRE (*Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 6, pp. 247–249*).—The author concludes that inosit is normally present in natural wine and discusses this question. The estimation of inosit is discussed.

Note on a method to distinguish wines made from red or white grapes (*Ann. Falsif., 1 (1908), No. 2, p. 85*).—The sulphuric acid reaction is not sufficient to determine whether a wine is made from white or red grapes.

The analysis of alcohols and brandies, MASTBAUM (*Abs. in Chem. Ztg., 33 (1909), No. 69, p. 626*).—It is stated that in the determination of aldehydes the methods commonly employed are either colorimetric or volumetric. The colorimetric methods are those of Gayon, Barbet, Jandrier and others. The higher alcohols are estimated chiefly by 3 methods, those of Saville-Girard, Roese-Stutzer-Sell, and Marquardt-Allen-Schidrowitz.

Detection of methyl alcohol in ethyl alcohol, A. VORISEK (*Jour. Soc. Chem. Indus., 28 (1909), No. 15, pp. 823–825, fig. 1*).—As the bichromate-sulphuric acid test often yields methylal and formaldehyde and sometimes oxidizes the

methyl alcohol completely, the author proposes the use of small amounts of chromic acid for the oxidation and the elimination of the sulphuric acid in the reagent.

The procedure is as follows: From 0.5 to 1 cc. of the alcoholic sample is taken in a small test tube, 1 cc. of 0.8 per cent chromic acid solution added, and diluted with water to a bulk of 4 to 5 cc. Two or three small pieces of pumice stone are then put in the test tube and the whole connected with an ordinary air condenser. The mixture is then boiled briskly and from 3 to 4 cc. of the distillate is collected in a test tube. The distillate is treated with 1 drop of a 4 per cent ferric chlorid solution and 2 drops of an albumin solution (white of 1 egg + 50 cc. of water filtered and preserved with a few drops of chloroform), and finally after mixing the above a layer of 4 to 5 cc. of sulphuric acid is added, taking especial care to prevent heating. A zone of sharply defined violet appears when methyl alcohol is present to the extent of 5 per cent. When there is less than 1 per cent, the color appears after several minutes. Organic substances which can not be removed in the mixture with methyl alcohol give a yellow to a reddish coloration.

The analysis of malt extract, E. S. Richards (*Rpt. Austral. Assoc. Adv. Sci., 11 (1907), pp. 350–352*).—Water, ash, dextrose, maltose, dextrin, albuminoids, the diastatic power, and the specific rotation were determined. The results of 6 analyses are given, with the methods employed.

On the action of Fehling's solution on malt sugar, W. L. Lewis (*Amer. Chem. Jour., 42 (1909), No. 4, pp. 301–319*).—This is a preliminary investigation of the products formed during the oxidation of malt sugar by cupric hydroxid in alkali.

The influence of pectin substances on the polarization in the analysis of sugar beets according to the Zscheye and von Strohmer and Fallada methods. H. Pellet (*Abs. in Chem. Ztg., 33 (1909), No. 67, p. 598*).—Sugar beets contain pectin bodies which are dextrorotary and with an optical activity 3 to 3.3 times as great as that of sugar. They are precipitated by lead acetate providing it is added in sufficient amount. Inverted solutions containing pectin bodies do not alter the rotation.

A colorimetric method for the determination of lactose in milk. R. Binaghi (*Rev. Gén. Lait, 7 (1909), No. 20, pp. 457–464, pl. 1, fig. 1*).—This is dependent upon the cherry-red coloration produced by a 40 per cent solution of sodium hydroxid in distilled water compared with a standard containing known amounts of lactose.

Clarification of milk for the lactose determination, C. Carrez (*Répert. Pharm. et Jour. Chim. Med., 3. ser., 21 (1909), p. 102; abs. in Jour. Pharm. et Chim., 6. ser., 30 (1909), No. 1, pp. 36, 37*).—To 10 cc. of the milk in a 100 cc. flask are added in turn 40 to 60 cc. of water, 2 cc. of 15 per cent potassium ferrocyanid solution, 2 cc. of a 30 per cent acetate of zinc solution, a drop of 1 per cent phenolphthalein solution, and just enough sodium hydroxid solution to make a pink color. The contents are then made up to 100 cc., shaken, and filtered.

The method can be employed for both human and cow's milk, but attention is drawn to the fact that in the case of human milk the polariscope can not be used, as in this case bodies are present which can not be removed by reagents and which are very active.

Esculin bile salt media for milk analysis, F. C. Harrison and J. Van der Leck (*Amer. Jour. Pub. Hyg., 19 (1909), No. 3, pp. 564–566*).—Since esculin in the presence of iron gives the colonies of *Bacillus aerogenes* and *B. coli* a black color, the use of esculin bile salt media is proposed for the detection of the pollution of milk from stable manure, dirt, etc. The method consists of

diluting the milk 1 : 100 and 1 : 500, according to the supposed pollution, mixing the milk and media on the plate, and, after solidification, placing the plate in the incubator at 37° C. and making the bacterial count at the expiration of 24 hours.

Some mineral substances which give the peroxydase reaction, J. Wolff (*Compt. Rend. Acad. Sci.* [*Paris*], *146* (*1908*), *No. 3, pp. 142–144; abs. in Zentbl. Agr. Chem., 38* (*1909*), *No. 4, pp. 278, 279*).—Iron oxysulphate, even in dilutions of 1 : 6,000,000, gives a coloration with guaiac tincture which has stood for a while. At concentrations of 100 mg. per liter this coloration is very intense. Freshly prepared guaiac tincture does not give the reaction, but if hydrogen peroxid is added the reaction becomes very marked; if the diluted iron solution is boiled with hydrogen peroxid, however, the reaction does not take place. Small amounts of mineral acid retard the reaction.

The retarding of the rennin action by milk, K. Schern (*Biochem. Ztschr., 20* (*1909*), *No. 3–5, pp. 231–247*).—It is shown by the results of this investigation that it is possible to detect milk of pathogenic animals, that is, animals suffering from mastitis, etc., by testing the retarding action of such milk upon rennet.

The detection and estimation of formaldehyde in milk, J. C. Brunnich (*Rpt. Austral. Assoc. Adv. Sci., 11* (*1907*), *pp. 348, 349*).—A critical study of various methods employed for the detection and determination of formaldehyde in milk.

"(1) For the qualitative detection of formaldehyde in fresh milk, Eury's or Bonnet's morphin test may be applied to the samples direct, and tests with Schiff's reagent, resorcin, phloroglucin, gallic acid, and phenylhydrazin to the distillate. (2) The qualitative detection of formaldehyde in old and sour milks presents no difficulties. (3) For the estimation of minute traces of formaldehyde in fresh milk, colorimetric methods—either Bonnet's, with the original samples, or Schiff's reagent, with the distillate—may be used with advantage. (4) In milks kept any length of time these methods will indicate a less quantity of formaldehyde than was originally present, depending mainly on the length of keeping."

Detection of small quantities of benzoic acid, salicylic acid, and saccharin in cream, G. W. Monier-Williams (*Local Govt. Bd.* [*Gt. Brit.*], *Food Rpts., 1909, No. 10, p. 33*).—By this method 100 cc. of cream are acidified with 1 cc. concentrated phosphoric acid and heated with constant stirring in a porcelain dish on an asbestos gauze until all the water has been driven off, care being taken not to heat over 120° C. The clear fat is then filtered through a dry filter, allowed to cool to 60 or 70°, and shaken out with 50 cc. of a 5 per cent solution of sodium bicarbonate, which has been previously heated to the temperature of the fat. The turbid alkaline extract is then filtered through a wet filter, made acid with 1 cc. of hydrochloric acid, cooled, and extracted 3 times with ether. The remainder of the procedure is that usually followed.

The action of light on butter fat, M. Siegfeld (*Milchw. Zentbl., 4* (*1908*), *No. 12, pp. 530–532; abs. in Molk. Ztg.* [*Hildesheim*], *23* (*1909*), *No. 37, p. 1045*).—Melted and filtered butter fat is very stable when stored in the dark, but when exposed to the light it takes on a disagreeable odor and becomes bleached. Among the changes which take place are a gain in weight and acidity, an increase in the Reichert-Meissl, saponification, and Polenske numbers, and a diminution in the iodin number. The volatile fatty acids of medium molecular weight do not change perceptibly, but the amount of solid nonvolatile acid becomes much higher. Oxidation is at once apparent.

Does the presence of iron in butter indicate poor quality? H. Höft (*Milchw. Zentbl., 5* (*1909*), *No. 6, pp. 250–252; abs. in Chem. Zentbl., 1909, II, No. 2,*

p. 141).—The detection of iron in butter does not warrant the conclusion of bad quality or bad taste.

Butter colors containing mineral oils, M. FRITZSCHE (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 9, pp. 528–531; abs. in Chem. Zentbl., 1909, II, No. 1, p. 53*).—In 2 butter colors examined the chief constituent was found to be a green fluorescent mineral oil, with a density of 0.9045 at 15° C., and a flash point about 360°. One of the colors contained 60 per cent of this oil with 2 per cent coloring matter and the balance oil of sesame. The other had 53 per cent of the oil, in addition to coloring matter and corn oil.

Modification of Halphen's reaction, L. GARNIER (*Jour. Pharm. et Chim., 6. ser., 29 (1908), No. 6, pp. 273, 274; abs. in Chem. Zentbl., 1909, I, No. 17, p. 1440*).—The author observed that equal amounts of cotton-seed oil gave reactions of various intensities, dependent upon whether a clear sulphur solution or much suspended sulphur in the bisulphid was employed as the reagent. In order to obtain both the maximum intensity and uniformity of color carbon bisulphid with 2 per cent of stick sulphur was used for all reactions. The reagent was prepared by shaking the ingredients, marking the height of the fluid, heating gently on a reflux condenser for 1 hour, and after cooling, refilling to the mark with carbon bisulphid. The reagent is then poured into test tubes of 14 to 15 mm. internal diameter, and standards are made representing 5, 10, 15, 20, 25, 50, 75, and 100 per cent of cotton-seed oil. These are preserved in a cool, dark place.

[Kreis's reaction for detecting peanut oil in olive oil], H. KRÜER (*Pharm. Ztg., 54 (1909), No. 36, p. 357; abs. in Chem. Ztg., 33 (1909), No. 77, Repert., p. 335*).—The reaction was found reliable to detect peanut oil, as while pure olive oil gives a yellow-brown color it never yields a red reaction. To execute the test equal volumes of oil and nitric acid (specific gravity 1.4) are taken and 0.1 per cent ethereal phloroglucin solution so brought on top as to make a stratum. At the point of contact a raspberry-red coloration ensues.

Oil of sesame can be detected by the furfurol reaction.

Shaking out v. extraction method for fats, B. SCHULZE (*Landw. Vers. Stat., 71 (1909), No. 1–3, pp. 239–243*).—With distillery slops the shaking out process gave results 3 per cent lower than the ordinary extraction method. In cases where the materials were dried previously the results coincided fairly well.

Investigation of the methods of determining pentosen and pentosans and their practical application, M. R. ADAN (*Österr. Chem. Ztg., 12 (1909), No. 13, p. 172*).—The method with phenylhydrazin was discarded, both on account of its complexity and, particularly, its toxicity. The author prefers the phloroglucin method.

Notes on fodder analysis, J. C. BRUNNICH and F. SMITH (*Rpt. Austral. Assoc. Adv. Sci., 11 (1907), pp. 343–348*).—In comparing the Maercker method with the diastase method for determining the total starch in grasses and like material, the latter was found to give the more correct estimate of the true starch content. A table of analyses of various grasses analyzed is given.

The determination of urea in urine, F. W. GILL, F. G. ALLISON, and H. S. GRINDLEY (*Jour. Amer. Chem. Soc., 31 (1909), No. 9, pp. 1078–1093, fig. 1*).—Conclusions follow which were drawn from extended studies of methods of analysis.

"Creatinin and hippuric acid are not at all decomposed by heating in the autoclave with hydrochloric acid but they are partially decomposed either before or after treatment with hydrochloric acid in the autoclave with 20 cc. of 10 per cent sodium hydroxid solution.

"Uric acid is decomposed in part by the autoclave treatment with hydrochloric acid and, moreover, it is still further decomposed into ammonia by distillation with 20 cc. of 10 per cent sodium hydroxid solution.

"The hydrolysis-aeration method gives practically the same urea nitrogen values as does the Folin method but the Benedict-Gephart method gives higher results than does the Folin method. . . .

"The hydrolysis-aeration method requires much less time and attention than does the Folin method and it does not require the expert manipulation and training necessary to get concordant results which the Folin method requires."

The estimation of phosphorus in urine, G. C. MATHISON (*Bio-Chem. Jour., 4 (1909), No. 5–7, pp. 233–239*).—According to the author's investigations the total phosphorus in urine is most conveniently estimated by the Neumann method as modified by Plimmer and Bayliss.

"Inorganic P_2O_5 is best estimated by precipitation with magnesium citrate mixture, incineration, and calculation from the weight of the ash, $Mg_2P_2O_7$. This method is shown to precipitate inorganic phosphates completely.

"Magnesia mixture gives incorrect and variable results, partly owing to the precipitation of calcium, partly to precipitation of a portion of the organic phosphorus.

"Organic P_2O_5 can be determined either by subtracting the inorganic from the total P_2O_5, or directly by applying Neumann's method to the filtrate after precipitation of inorganic phosphates by magnesium citrate or barium chlorid.

"The uranium acetate method is unsuitable for accurate work. Statements as to the existence or nonexistence of organic phosphorus in the urine based on uranium acetate estimations are valueless.

"It is important to make the determinations of organic P_2O_5 in fresh samples of urine, as the organic compound is partially or completely decomposed in the course of a few weeks, or, if ammonia be present, in a few days.

"The organic phosphorus compound is readily dialyzable, and is not precipitated by reagents that precipitate traces of protein."

A comparison of the methods for the estimation of total sulphur in urine, S. RITSON (*Bio-Chem. Jour., 4 (1909), No. 8, pp. 337–342*).—The author concludes from comparative studies that the sodium peroxid method carried out according to Asbóth-Modrakowski gives the highest figures in the estimation of total sulphur in urine, "and must therefore be considered to be the most trustworthy of the methods at present in use."

The use of barium peroxid in the estimation of total sulphur in urine, S. RITSON (*Bio-Chem. Jour., 4 (1909), No. 8, pp. 343–345*).—From his investigations it follows, according to the author, "that the estimation of total sulphur in urine by means of a mixture of barium and sodium peroxids gives the highest results and possesses the further advantage of being carried out rapidly."

Chemical tests for blood, J. H. KASTLE (*Pub. Health and Mar. Hosp. Serv. U. S., Hyg. Lab. Bul. 51, pp. 62*).—Phenolphthalein was studied in regard to its action toward the peroxydases, with particular reference to its employment for the detection of blood.

It was found that on the whole it was more sensitive for various substances containing blood than the other reagents used for the purpose. In the case of milk it was necessary to coagulate either with an acid or spontaneously in order to carry out the test, the peroxydases or reacting bodies being retained or dissolved by the whey. With boiled milk the test was as sensitive as the benzidin test. It was further found possible to determine the amount of blood by color comparison.

The examination of bituminous materials for road construction, C. Richardson and C. N. Forest (*Chem. Engin., 10 (1909), No. 3, pp. 96, 97*).—A description of various methods employed for the examination of bituminous substances for road making. The determinations considered are the specific gravity, flash test, naphtha soluble bitumen and its character, residual coke or fixed carbon, paraffin scale, and cementing value.

The Munroe crucible, W. O. Snelling (*Jour. Amer. Chem. Soc., 31 (1909), No. 4, pp. 456–461*).—To prepare this crucible a finely perforated platinum crucible is filled with a mixture of ammonium-platinic-chlorid in alcohol, and pressed upon a few layers of filter paper until all the alcohol has been absorbed. When there is a layer of double salt of from 0.25 to 0.5 cm. upon it the residual alcohol in the crucible is driven off by careful heating, the temperature raised until the decomposition of the salts sets in, and the crucible then heated strongly to redness. If the layer of spongy platinum is not level it may be pressed with the flattened end of a glass rod, or better, the original operation may be repeated.

Solvents for use with the Munroe crucible, O. D. Swett (*Jour. Amer. Chem. Soc., 31 (1909), No. 8, pp. 928–932*).—When the Munroe crucible is employed for the same kind of material throughout it rarely becomes necessary to remove the precipitate from the previous determinations save when the accumulation becomes large, but with differing analyses this must be done. The author has therefore compiled a list of new and already known solvents for use with the different precipitates.

A modified form of Gooch crucible, T. W. Richards (*Jour. Amer. Chem. Soc., 31 (1909), No. 10, p. 1146, fig. 1*).—The modification consists in the addition of a flaring brim to the rim of the crucible, which makes it easy to transfer precipitates from a large beaker without loss.

[**A modified Gooch crucible**], O. Brunck (*Chem. Ztg., 33 (1909), No. 71, pp. 649, 650, fig. 1*).—The Neubauer modification consists in replacing the asbestos layer on the perforated bottom of the crucible by a layer of spongy platinum, burning this in so that it adheres to the sides. Experiments showed that this held back the smallest particles of precipitate.

The effect of ultraviolet rays upon fermenting ciders, Maurain and Warcollier (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 2, pp. 155, 156; abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 16, p. 900*).—The ultraviolet rays checked the fermentation of cider, this being due to the absorption of the rays by the cider itself. The source of the rays in this experiment was a mercury vapor lamp.

By-products of the sugar beet and their uses, C. O. Townsend (*U. S. Dept. Agr. Yearbook 1908, pp. 443–452*).—Aside from the obtaining of sugar from the sugar beet little is ordinarily done in this country in the way of the utilization of its by-products. It is pointed out, however, that these can be employed for stock feeding, for fertilizing, for the production of denatured alcohol, and in the manufacture of cement. The author presents data which indicate the monetary returns that might be obtained in these ways.

Sugar-cane wax: A study of the possibility of obtaining this commercially. A. Wijnberg (*Over Rietwas en de Mogelijkheid Zijner Technische Gewinning. Proefschr. Tech. Hoogeschool Delft, 1909, pp. 198, pls. 5*).—According to the author the filter waste from sugar cane, calculated to dry substance, contains 10 per cent of a waxy substance. A study was made as to the chemical and botanical nature of this substance and its economic preparation and utilization.

The manufacture of flavoring extracts, E. M. Chace (*U. S. Dept. Agr. Yearbook 1908, pp. 333–342, pls. 4*).—The author discusses the various phases in-

volved in the manufacture of the more generally employed flavoring extracts. Those which are included in the list are vanilla, lemon, orange, peppermint, wintergreen, and almond, and the extracts prepared from the higher alcohols and esters, the latter being listed as imitations. In the case of vanilla special prominence is given to the origin and cultivation of the beans, their grading, and the preparation of the extract therefrom. The manufacture of lemon oil is also given in detail.

Milk and egg powders, M. POPP (*Chem. Ztg., 33 (1909), No. 71, pp. 647, 648*).—The manufacture of dried milk, milk powder, and egg powder is discussed and the composition of these products prepared under varying conditions is shown.

The pollution of canned goods after sterilization, PFUHL (*Ztschr. Hyg. u. Infektionskrank., 61 (1908), No. 2, pp. 209–212*).—In view of the fact that many manufacturers do not take sufficient precautions in regard to hermetically sealing their canned goods the author sterilized cans of the regular stock and others purposely polluted. On examination those which had been polluted were found to have become sterile, whereas the ordinary stock on being examined after a week or so was found to contain bacteria. From this it is concluded that the pollution took place after the sterilizing process.

Examination of varnishes for canning purposes, T. GRUBER (*Ztschr. Öffentl. Chem., 15 (1909), No. 6, pp. 107–110; abs. in Chem. Zentbl., 1909, I, No. 18, p. 1512; Pure Products, 5 (1909), No. 8, p. 409*).—Tests to determine the suitability of varnish for canning purposes are reported.

Antiformin: A study of the bacterial solvent properties of this substance, UHLENHUTH and XYLANDER (*Arb. K. Gsndhtsamt., 32 (1909), No. 1, pp. 158–217, pl. 1*).—Analysis of this product, calculated as hypochlorite of soda, showed it to contain 7.5 per cent sodium hydroxid and 5.6 per cent of chlorin. When allowed to act upon sputum, feces, cholera tubercle, pneumonia, and other bacteria, manure pits, etc., it was shown to be efficient under the conditions described.

METEOROLOGY—WATER.

The so-called change of climate in the semiarid West, R. H. SULLIVAN (*U. S. Dept. Agr. Yearbook 1908, pp. 288–300, fig. 1*).—From a review of the available data the conclusion is reached "that the so-called changes in climate have been nothing more than irregular oscillations; that a succession of dry years has given way to recurring wet years; that there are alternating series of warm and cool years; that thus far there are imperfect seasons of maximum winds attending low-latitude storm movements, with turns to minimum winds attending high-latitude storm movements; that droughts are possible in any part of the country at any time, winter or summer; and that it is beyond the power of memory even to chronicle the abnormal in weather, without considering its application to climate."

Climate of Yukon Territory, R. F. STUPART (*Trans. Canad. Inst., 8 (1909), III, No. 18, pp. 291–295*).—Meteorological observations begun at Fort Constantine in 1895 and continued at Dawson since 1900, and partial records at Selkirk, Tagish Lake, and White Horse are summarized.

"A study of all available data leads to the conclusion that while Dawson is farther north than White Horse, the climate of the former place is much more suitable for agricultural purposes than that of the latter, and in general that the northern and eastern portions of the Yukon have a warmer summer climate than have the more southern portions."

The influence of insolation on the temperature of different sides of a valley, C. BUHRER (*Bul. Soc. Vaud. Sci. Nat., 5. ser., 45 (1909), No. 165, pp. 207–212*).—Observations in a number of Swiss valleys are reported, showing a decided difference in temperature depending upon their situation with reference to sunlight.

Instruments for making weather observations on the farm, D. A. SELLEY (*U. S. Dept. Agr. Yearbook 1908, pp. 433–442, pl. 1, figs. 2*).—The simpler forms of apparatus and methods for determining temperature, pressure, precipitation, and dew-point are described, with a view to encouraging farmers to make accurate observations.

Weather reports for Alaska, C. C. GEORGESON (*Alaska Stas. Rpt. 1908, pp. 72–80*).—Tabular summaries are given of the reports of the volunteer weather observers of the Weather Bureau of Alaska on temperature, precipitation, and general weather conditions during the year ended October 31, 1908.

Meteorological record (*New Hampshire Sta. Rpts. 1907–8, pp. 561–586*).—Daily, monthly, and annual summaries of observations at Durham, N. H., on temperature, precipitation, cloudiness, and direction of wind during the period from July 1, 1906, to June 30, 1908. The mean annual temperature for the year ended June 30, 1908, was 45.8° F., the precipitation 39.37 in., and the depth of snow 30.5 in.

[Meteorological observations at Wisley in 1908], R. H. CURTIS (*Jour. Roy. Hort. Soc. [London], 35 (1909), No. 1, pp. 41–52, figs. 3*).—This is a report of the usual observations on temperature, rainfall, humidity, sunshine, and winds, summarized by months, at the garden of the Royal Horticultural Society.

Meteorological observations (*Statis. Jahrb. Deut. Reich, 30 (1909), pp. 406, 407*).—The average temperature, precipitation, humidity, and cloudiness for each month of 1907 at a large number of places in the German Empire are recorded.

Rainfall observations (*Mem. y Rev. Soc. Cient. "Antonio Alzate," 27 (1908), No. 2, pp. 51–72*).—Tables are given which show the daily and monthly rainfall from 1901 to 1907 at two places in the State of Puebla, Mexico.

On the sodium and the chlorin in river and rain waters, H. S. SHELTON (*Chem. News, 99 (1909), No. 2583, pp. 253, 254; abs. in Chem. Abs., 3 (1909), No. 19, p. 2335; Chem. Ztg., 33 (1909), No. 86, Repert., p. 376*).—It is pointed out that the content of sodium and chlorin in river and rain water as determined by ordinary analysis is an unreliable basis for geological and cosmological speculations. It is necessary to determine the alkalis, particularly the sodium, with a high degree of accuracy, directly and not by difference. Sodium and chlorin should be separately determined.

The mineral content of Illinois waters, E. BARTOW, J. A. UDDEN, S. W. PARR, and G. T. PALMER (*Univ. Ill. State Water Survey Bul. 4, pp. VIII+192, figs. 9*).—This bulletin treats in a very complete manner the geographic and physical and chemical classification of the waters of Illinois, the methods used in the examination of the waters, and the interpretation of the results. As a result of the large number of examinations reported the following standards for the interpretation of the results of sanitary water analysis are suggested:

Suggested standards for interpretation of results of sanitary analysis of Illinois waters.

	Lake Michigan.[a]	Streams.[b]	Springs and shallow wells.	Deep drift wells.	Deep rock wells.
Turbidity	None.	10.0	[c] None.	[c] None.	[c] None.
Color	None.	.2	[c] None.	[c] None.	[c] None.
Odor	None.	None.	None.	None.	None.
Residue on evaporation	130	300	500	500	500
Chlorin	5.5	6	15	15	5–100
Oxygen consumed	1.6	5	2	[d] 2–5	[d] 2–5
Nitrogen as—					
Free ammonia	.000	.050	.020	.02–3	.02–3
Albuminoid ammonia	.080	.150	.050	.200	.150
Nitrites	.000	.000	.000	.005	.000
Nitrates	.000	.500	2.000	.500	.500
Alkalinity	----------	200	300	300	300
Bacteria per cubic centimeter	500	500	500	100	100
Colon bacillus in 1 cubic centimeter	Absent.	Absent.	Absent.	Absent.	Absent.

[a] Analyses of water 10 miles from shore of Lake Michigan. [b] This standard of purity is seldom found in the unfiltered water, as all streams are more or less polluted. [c] None when drawn from wells. They may become turbid and develop color on standing. [d] Varies as the waters contain ferrous salts.

The economic value of protecting the water supplies, H. B. Wood (*Jour. Amer. Med. Assoc., 53 (1909), No. 14, pp. 1093–1098*).—The economic loss in human life and health and in the destruction of fish as a result of pollution of water supplies by sewage and factory waste is briefly discussed. Figures are also given showing the reduction in typhoid mortality as a result of the establishment of improved sewerage and water filtration works in Boston, Lawrence, London, Berlin, Breslau, and Munich, and in 13 Massachusetts cities (average).

Private sewerage (*Va. Health Bul., 1 (1909), No. 10, pp. 286–288, figs. 2*).—This article describes briefly simple systems of sewage disposal adapted to small cottages and larger houses. The principal features of these systems are a septic tank connected with an anaerobic filter and a flush tank with siphon. The simpler plant described "can be made from materials easily procured and can be installed by any practical man."

SOILS—FERTILIZERS.

A study of the reactions between the manurial salts and clays, mucks and soils, F. W. Morse and B. E. Curry (*New Hampshire Sta. Rpts. 1907–8, pp. 271–293, figs. 4*).—A series of studies is reported, the results of which are summarized as follows:

"The water extracts of most soils, drainage, pond and lake waters, are alkaline when boiled.

"Clays and clay soils extracted with water yield alkaline solutions when free from carbon dioxid.

"Most clay, clay soils and muck, and some other soils yield acid solutions when extracted with salt solutions.

"Clays and soils react with potassium, sodium and ammonia in equivalent quantities when these bases are present as salts. Calcium, magnesium, iron and aluminum constitute the largest amount of reacting bases. With ammonium nitrate the base is removed more rapidly and free nitric acid is left in solution.

"The amount of iron and aluminum in solution is equivalent to the acid content of these solutions.

"The presence of lime and carbonate of lime prevents the formation of soluble iron and aluminum, or, what doubtless is more exact, precipitates these bases from solution.

"The reaction between fuller's earth and the salt solutions takes place rapidly. Veitch has shown that in soils the reaction extends through a greater period of time. The amount of reacting bases depends upon the concentration of the salt solution.

"The reaction between clays and soluble carbonates results in the removal of the bases from solution and the formation of bicarbonates or free CO_2. The amount of bases removed from solution depends upon the concentration of the carbonate solution.

"The acid character of the solutions formed in these ways does not demand the presence of an acid to complete an explanation for their formation.

"Where a free base is present it is simply removed from solution without forming any soluble reaction product.

"When such salts as potassium phosphate come in contact with clays, soils, or mucks, both base and acid are rapidly removed from solution. There are no soluble by-products formed during the reactions involved.

"In the presence of clay the solubility of lime is greatly depressed.

"The absorptive capacity of volatile substances is shown by the absorption of ammonia and iodin.

"The absorptive properties of the soils is illustrated by analogy, when filter paper is allowed to react with litmus solution, or when carbon black reacts with salt solutions.

"The general behavior of muck toward the salt solutions is not unlike that of the clay. The acid character of the salt extract of the muck is due to the absorption of the base or the liberation of free organic acid, or both. Iron and aluminum do not enter into these reactions to any marked extent.

"The acidified alkali extract of muck will precipitate lime and small quantities of potassium from solution, but will not remove phosphoric acid from solution.

"In a general way the tendency for clay soils, etc., is to reduce the solubility of bases with which they come in contact.

"Where iron and aluminum are found in clay or soil extracts, the presence of soil acids is not necessary to explain the character of the solution. In muck and peaty soils the acid character of the salt extracts is largely due to increased solubility of the organic decomposition products.

"The reactions shown . . . explain the rapid disappearance from solution when potassium, ammonia and phosphoric acid are added to soils for fertilizers."

The potash requirements of a clay soil, F. W. Morse and B. E. Curry (*New Hampshire Sta. Rpts. 1907–8, pp. 263–271*).—The investigations reported in this article were made with typical upland and lowland clay soils of granitic origin collected from different fields on the college farm.

Chemical analyses of the soils showed a higher percentage of both total potash and water-soluble potash in the lowland soils, although the ratio between soluble and total potash was the same for the two classes of soils. The composition of the hay crop grown on the soils indicated that the decrease of potash in the soil was directly proportional to the increase in yield of crop.

The results of experiments with different fertilizing materials indicate "that potassium is not the limiting element in hay production on these strong clay soils. The drain on the soil potash is proportional to the yield of the crop as a general rule; but any treatment which will bring about increased production of the crop may be independent of potash, since the soil shows a capacity to meet any increased demand for that constituent."

The effect of soils on the solubility of potassium, F. W. MORSE and B. E. CURRY (*New Hampshire Sta. Rpts. 1907–8, pp. 293–297*).—Studies of the changes in solubility of potash when added in the form of chlorid to clay and sandy clay soil and sandy loam are reported.

It was found that the soils quickly and completely fixed the soluble potash and converted it into insoluble forms. "The rate at which these changes take place has been shown to be very rapid under favorable conditions; also it has been demonstrated that large quantities of potassium may be acted upon." This is considered "an argument in favor of light and numerous applications of potassium for either chemical or mechanical effects."

Some notes on the solubility of potassium of soils and soil minerals, F. W. MORSE and B. E. CURRY (*New Hampshire Sta. Rpts. 1907–8, pp. 297–310, fig. 1*).—This paper reports the results of studies of the solubility of the potash of feldspars when acted upon by lime, gypsum, sodium nitrate, ammonium sulphate, sodium carbonate, and sodium phosphate, and of soil when acted upon by lime and gypsum.

The conclusions reached were that—

"In general, the amount of water-soluble salts in a given soil is dependent on the amount of soil moisture, and the time during which the soil and moisture have been in contact, providing, of course, that the time has not been sufficient to establish equilibrium. Equilibrium having been established, the amount of solute depends on the amount of moisture.

"The rate at which the feldspar dissolves is fairly rapid until approximate equilibrium is established.

"The rate at which the soil minerals dissolve decreases as equilibrium is approached.

"The effect of these solvents is to increase the amount of soluble potassium in the feldspars.

"Time produces the most pronounced results.

"These solvents do not increase the amount of water-soluble potassium in soils.

"We have not been able to replace the potassium in zeolytes (apophylite), by stirring the ground mineral with lime.

"The results are different, depending on whether soil or mineral is subjected to the action of these solvents. The difference is due to the presence of clay in the soils.

"The action of the clay is not dependent on temperature.

"The addition of clay to a solution of CaO depresses the solubility of the CaO. This action, apparently, is analogous to the depression of the solubility of potassium.

"From a laboratory point of view, the effects of lime on a soil are more mechanical than chemical. The mechanical effects are easily noted. The chemical effects can not be followed.

"In a practical way the mechanical effects due to the action of lime may or may not produce greater crop yields. At present we can not make predictions either way with any great certainty.

"Neither field nor laboratory work has been able to establish any relation between applications of lime to soil and the amount of water-soluble potassium in the soil moisture."

The distribution of potassium in cultivated soils (*Engrais, 24 (1909), No. 15, p. 409; abs. in Chem. Abs., 3 (1909), No. 18, p. 2192*).—It is stated that the greater part of the potash in soils is in the form of double silicate of potash and aluminum, which is not readily assimilated by plants. It is for this reason

that soils shown by chemical analysis to contain considerable percentages of potash often respond profitably to potash fertilizing.

Changes produced in soils by subjecting them to steam under pressure. T. L. LYON and J. A. BIZZELL (*Abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 13, p. 721*).—This is an abstract of a paper presented before the International Congress of Applied Chemistry at London.

"The soils, clay loam, sandy loam, and silt loam were heated in an autoclave under two atmospheres' pressure for 2 or 4 hours. Steaming increased the water-soluble organic and ammonia nitrogen, total ammonia nitrogen, nitrites, and total soluble matter, the latter consisting largely of organic matter. The nitrates, however, were decreased by the treatment. On standing 56, 82, or 90 days there were decreases in the soluble matter, soluble and ammonia nitrogen, and nitrites, while the nitrates remained practically constant.

"Wheat grown in the steamed soils appeared at first to be injured by the treatment, but subsequently recovered, and at the end of the experiment was much superior to that grown in the unheated soils. The sandy loam was first to recover, the clay next, and the silt last. The injury seemed to be mitigated somewhat when the steamed soil was inoculated by an infusion of the fresh soil. Plants grown in extract made from steamed soil gave poor growth. Injurious substances seemed to be produced during the steaming process. In the unsteamed soils there was a loss of total soluble matter where crops were grown, but in the steamed soils the reverse was true."

The changes in the nitrogen in soil, W. KRUEGER (*Ein Beitrag zur Untersuchung der Stickstoffumsetzungen in Boden. Inaug. Diss. Königsberg, 1908, pp. 58; rev. in Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 6–9, p. 236; Chem. Abs., 3 (1909), No. 18, p. 2192*).—Studies of the effect of lime, calcium carbonate, and aeration on the nitrifying, denitrifying, and nitrogen-collecting power of soils and on the decomposition of nitrogenous organic matter are reported.

There was a slight increase of nitrogen in the plats receiving lime, and in the case of humus and clay soils the use of fertilizers was accompanied by an increase in nitrogen. There was found to be a certain parallelism between nitrogen assimilation in nutrient solutions and in the soil. Calcium carbonate was more effective in promoting nitrification than lime, but lime favored the activity of putrefactive bacteria. The formation of ammonia from peptone was especially favored by calcium carbonate. Aeration increased the assimilation of peptone but decreased denitrification.

The influence of carbon bisulphid on nitrogen transformations in the soil. R. SCHERPE (*Arb. K. Biol. Anst. Land u. Forstw., 7 (1909), No. 3, pp. 353–428*).—The investigations reported in this paper dealt with the action of carbon bisulphid in rendering the nitrogen of the soil more available and its effect on the nitrification process in soils.

The results of series of pot and field experiments indicate that the beneficial effect of the application of carbon bisulphid to soils is due to its action in rendering plant food available in the soil. The effect of the bisulphid upon nitrification was somewhat variable, but there was generally a reduction of nitrification activity. Various theories which have been advanced to explain the action of bisulphid on nitrification are briefly discussed.

New facts about bacteria of California soils. C. B. LIPMAN (*Science, n. ser., 29 (1909), No. 754, pp. 941, 942; abs. in Chem. Abs., 3 (1909), No. 18, p. 2192*).—The author's investigations indicate that the transformation of ammonia compounds into nitrites occurs in the soil at depths of from 5½ to 12 ft. The formation of nitrate was not observed below 2 ft. A soil which had been kept for 31 years in a tightly stoppered bottle was found to contain at least one

representative of each of the groups of nitrogen-transforming or assimilating bacteria except *Bacterium radicicola*. A new species of Azotobacter was also found. The species of Nitrosomonas found in this soil had spores.

On the fixation of the free atmospheric nitrogen by micro-organisms, H. R. CHRISTENSEN (*Tidsskr. Landbr. Plantcavl, 16 (1909), No. 2, pp. 303–336, figs. 5*).—A résumé of the more important investigations relating to this subject, covering the period from Hellriegel and Willfarth to recent times (May, 1909). A bibliography of the subject is given at the close of the article.

Bacillus amylobacter in its morphological, physiological, and systematic relations, G. BREDEMANN (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 14–20, pp. 385–568, pls. 6, figs. 13; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 561, II, p. 601*).—The present state of knowledge with reference to this organism, especially as regards its nitrogen-fixing power, is summarized in this article. A very complete bibliography of the subject is also given.

The characteristic features of the organism are its power of fixing nitrogen, decomposing carbohydrates with the formation of alcohol and volatile acids, and making and storing glycogen. As indicated by the amount of volatile acids produced, there was little variation in function in organisms from different sources.

Manganese in soils and in plants, P. BONAME (*Sta. Agron. Mauritius Bul. 20, 1909, pp. 30–34*).—Analyses are reported which show that manganese is widely distributed in considerable amounts (as high as 0.4 per cent) in the soils of Mauritius and consequently is present in considerable amounts in plants (as high as 1.26 per cent in arrowroot) grown on these soils.

Humus—its importance to soil fertility and its use with lime, J. N. HOFF (*Jour. Amer. Peat Soc., 2 (1909), No. 2, pp. 41–52*).—A brief general discussion of the subject is given.

A contribution to Volger's theory of the formation of soil water, KRÜGER (*Gsndhts. Ingen., 32 (1909), No. 28, pp. 469–473*).—A series of laboratory and field experiments is reported, the results indicating in general that the free water of the soil is very slightly increased by capillary condensation of the moisture of the air.

Soil mulches for checking evaporation, S. FORTIER (*U. S. Dept. Agr. Yearbook 1908, pp. 465–472, figs. 7*).—The extent of the loss of water from the soil under irrigation is pointed out and the use of deep furrows and granular soil mulches to reduce this loss is explained. It is shown as a result of tank experiments in different localities that "the deeper the mulch the less the evaporation, but there are practical considerations which limit the depth of soil mulches. A depth of less than 9 in. and more than 3 in. would meet the requirements of the arid region in general."

Peat and swamp lands, J. H. PRATT (*Jour. Amer. Peat Soc., 2 (1909), No. 1, pp. 13–17*).—This article briefly discusses the extent and importance of drainage and the agricultural and industrial value of drained peat and swamp lands.

The drainage and value of peat lands for agriculture, S. M. WOODWARD (*Jour. Amer. Peat Soc., 1 (1908), No. 3, pp. 61–67*).—The history, methods, and extent of drainage work are briefly reviewed in this article, the information given being based largely upon the work of the Drainage Investigations of this Office.

Swamp lands and their reclamation, H. M. WILSON (*Jour. Amer. Peat Soc., 1 (1908), Nos. 1, pp. 8–10; 2, pp. 34, 35*).—This article gives information regarding the extent of swamp lands in the United States and the reclamation of such lands by the individual States and by the United States.

Soil survey of Dubois, Perry, and Crawford counties, Indiana, C. W. SHANNON (*Ind. Dept. Geol. and Nat. Resources Ann. Rpt., 33 (1908), pp. 277–342, pls. 8, maps 4*).—Observations on the physiography, geology, climate, history of settlement and development, and soils of these 3 counties, embracing an area of about 1,015 square miles, are reported with a discussion of the plant food in the soils and their fertilizer requirements. These surveys were made under the direction of the department of geology and natural resources of the State and are supplementary to a number of similar surveys which have been made in different parts of the State by the Bureau of Soils of this Department.

Reviewing the results of the surveys, it is stated that they show a marked deficiency of plant food in southern Indiana soils due to the fact that these soils are derived from formations containing but small amounts of the elements of plant food. The soils are low in organic matter and of such texture as to be difficult of cultivation in many cases. The use of raw phosphate and of leguminous crops as green manure in rotation with grain crops and potatoes is recommended as a means of improving the soils. Advice is also given as to the use of commercial fertilizers.

Soil survey of Daviess County, L. C. SNIDER (*Ind. Dept. Geol. and Nat. Resources Ann. Rpt., 33 (1908), pp. 343–357, pls. 2, map 1*).—A survey similar to those noted above is reported. It is stated that 4 general types of soils occur in this county, namely, river and stream bottoms, sand, marsh or prairie areas, and upland clay. Many of the soils are quite productive. The predominance of clay soils makes the production of staple crops, corn, wheat, hay, and live stock, the leading agricultural feature of the region.

Surface geology of Michigan, A. C. LANE (*Rpt. Bd. Geol. Survey Mich., 1907, pp. 89–152, pls. 5, figs. 14, maps 2*).—This report is intended "as an introduction to the surface geology of the State and its bearing on the study of the soils, surface deposits, and physical geography, for the use of our public school teachers and their pupils, and as a key to the large scale maps of the surface geology," which are being prepared. Types of Michigan soils are described under dune sand, muck, peat, and meadow soils, and Clyde, Marshall gravel, Superior, and Miami soil types as defined by the Bureau of Soils of this Department.

Results of analyses of cultivated soils, F. F. VILLASEÑOR (*Mem. y Rev. Soc. Cient. "Antonio Alzate," 27 (1908), No. 1, pp. 19–28*).—Physical and chemical analyses of a number of samples from San Luis Potosi, Mexico, are reported.

The soils of Nevis, F. WATTS and H. A. TEMPANY (*West Indian Bul., 10 (1909), No. 1, pp. 60–79, dgms. 14; abs. in Chem. Abs., 3 (1909), No. 18, pp. 2191, 2192*).—In further study of the soils of the Leeward Islands, chemical and physical analyses of a number of samples of soils of Nevis were made and the results are briefly summarized.

Notes on the soils of Bengal, D. N. MOOKERJEE (*Indian Agr., 34 (1909), Nos. 7, pp. 217–220; 8, pp. 253, 254*).—The geological origin and formation of the soils of this region are briefly discussed and typical soils are described.

Physico-chemical properties of Russian black soil, B. KURILOFF (*Abs. in Chem. Ztg., 33 (1909), No. 71, p. 653*).—The properties of the Russian black soil are described with the aid of tabular data and diagrams based upon chemical analyses of the soil.

The value of the present-day soil analysis, C. BLOCH and M. HOFFMANN (*Mitt. Landw. Inst. Breslau, 4 (1907), No. 1–2, pp. 305–319; abs. in Chem. Zentbl., 1909, 1, No. 1, p. 318; Chem. Abs., 3 (1909), No. 19, p. 2337*).—Studies of the accuracy of the determination of mineral constituents in carefully sampled soils are reported, indicating that even with the greatest care there are

considerable variations in such determinations. The averages of 5 means of 5 samples each were found to give results which could be relied upon. Variations due to applications of potash and soda could not be accurately determined. On the other hand, those due to applications of lime and phosphoric acid were readily detected.

Soil testing, F. W. TAYLOR (*New Hampshire Sta. Rpts. 1907–8, pp. 311, 312*).—Tests of the wire-basket method of the Bureau of Soils of this Department are reported, the general conclusion being "that the method, while simple and of comparatively easy operation, fails to determine with any considerable degree of accuracy the manurial requirements of our common types of soil. It is probable, however, that with soils markedly deficient in humus or in one or more particular elements, the method would have some value in making the determination."

How can the farmer maintain the fertility of the soil? C. G. HOPKINS (*Quart. Rpt. Kans. Bd. Agr., 28 (1909), No. 109, pp. 35–46*).—The causes of a decline of soil fertility are discussed and the use of rotations, manure, and phosphates to restore productiveness in soils of the corn belt is explained. The basis of the system is an increase of humus and phosphates.

Fertilizers and manures, A. D. HALL (*London, 1909, pp. XVI+384, pls. 7*).—This book is meant to be a companion to the author's treatise on the soil (E. S. R., 20, p. 1113), and both are intended for the use of farmers and senior students and teachers in English agricultural schools. The presentation of the subject is as nontechnical as possible, but assumes some elementary knowledge of chemistry.

The book contains a brief historical statement and very lucidly presents the argument for the use of fertilizers as well as the principles upon which the modern theory of the use of fertilizers is based.

In the author's opinion "the future . . . lies with intensive farming; every year the ratio of the cultivable land to the population of the world shrinks; every year science puts fresh resources in the hands of the farmer. . . . Intensive farming implies the use of fertilizers; still more it implies, or should imply, skill and knowledge in using them."

The results of the Rothamsted experiments have been freely drawn upon in the preparation of the book, and, as the author states, much of the matter has already been printed (E. S. R., 18, p. 921; 20, pp. 428, 1018).

The book contains an introduction and chapters dealing with fertilizers containing nitrogen, the function and comparative value of nitrogenous manures, phosphatic manures, the function and use of phosphatic fertilizers, the potassic fertilizers, farmyard manure, Peruvian guano and other mixed fertilizers, materials of indirect fertilizing value, theories of fertilizer action, systems of manuring crops, the valuation and purchase of fertilizers, and the conducting of experiments with fertilizers.

Artificial manures, G. VILLE, trans. and edited by W. CROOKES, rev. by W. CROOKES and J. PERCIVAL (*London, New York, Bombay, and Calcutta, 1909, new ed. rev., pp. XXXVIII+347, pls. 6, figs. 10; rev. in Chem. News, 100 (1909), No. 2592, p. 59*).—This is a new edition of this translation, containing much new matter relating especially to substances which have recently come into prominence as fertilizing agents, and adapting the formulas for fertilizers to modern requirements and to the needs of the English farmer.

Mineral fertilizers in 1908, L. GRANDEAU (*Jour. Agr. Prat., n. ser., 18 (1909), Nos. 28, pp. 77, 78; 29, pp. 107–109*).—Statistics of the production and consumption of fertilizers during 1908 are briefly reviewed. The production of raw phosphate is given as about 5,000,000 tons. The larger part of this raw phos-

phate was converted into superphosphates, of which about 7,500,000 tons were produced. The production of Thomas slag is stated to have been about 3,000,000 tons.

The world's consumption of nitrate of soda during 1908 is given as 1,748,000 tons, of sulphate of ammonia 878,000 tons, of Norwegian nitrate 25,000 tons, and of calcium cyanamid 20,000 to 25,000 tons. Data are given regarding the development of new potash deposits and the use of potash salts and other fertilizing materials in France.

Losses of manurial constituents in, and the action of preservatives on, farmyard manure during storage, R. A. BERRY (*Abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 13, pp. 722, 723*).—This is a note on a paper presented at the International Congress of Applied Chemistry at London, which gave an account of investigations to compare losses of the fertilizing constituents in manure kept in exposed heaps in a climate with an average rainfall of 41 in. with the losses occurring under cover, and showing the effect of different preservatives on the nitrogen content of manure in storage. The rainfall during the period of experiment was 15.1 in. and the mean temperature 39.5° F.

The average effect of storage was to increase the ratio of insoluble nitrogen and to decrease the ammoniacal nitrogen by about 10 per cent. There was a decrease in total nitrogen of about 29 per cent. The effect on the mineral constituents was to produce a slight decrease in the ratio of soluble to total phosphates and potash. The general effect of the use of preservatives (superphosphate, kainit, gypsum, acid sodium phosphate, chalk, bleaching powder, formalin, and chloroform) in comparison with covering the manure with soil and closely and loosely packing it was to increase the ratio of insoluble nitrogen by 4.5 per cent and of ammoniacal nitrogen by 3 per cent. The losses of total nitrogen were variable. The best results in preserving the manure were obtained by packing it closely and covering with a layer of soil.

Investigations relative to the use of nitrogenous fertilizers, 1898–1907, E. B. VOORHEES and J. G. LIPMAN (*Abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 13, p. 723*).—In this paper, presented at the International Congress of Applied Chemistry at London, the authors summarized investigations at the New Jersey Stations extending over 10 years (E. S. R., 21, p. 529).

On the consequence of nonfusion of nitrate of soda in the soil, A. DEMOLON (*Jour. Agr. Prat., n. ser., 17 (1909), No. 18, pp. 557–559*).—This article, based largely upon investigations by Müntz and Gaudechon (E. S. R., 21, p. 23), Hall, and Dehérain, shows the importance of taking account of the moisture content of the soil in the application of nitrate of soda and of applying the nitrate in a fine state of division at times when the soil contains sufficient moisture to bring the material rapidly into solution and diffuse it widely in the soil.

The action of sulphate of ammonia on light sandy soils, A. IMELMANN (*Deut. Landw. Presse, 36 (1909), No. 72, pp. 768, 769*).—Experiments with beets and oats during 1907 and 1908 in continuation of experiments with rye and potatoes in 1905 and 1906 (E. S. R., 19, p. 926) are briefly reported. The results show that under the conditions of these experiments the sulphate of ammonia gave profitable returns when used on light sandy soils in connection with the necessary amount of phosphoric acid and potash.

The use of sulphate of ammonia on sandy soils, BACHMANN (*Landw. Wchnbl. Schles. Holst., 59 (1909), No. 40, pp. 673–675*).—Tests of different amounts and methods of applying sulphate of ammonia on rye grown on sandy soils are reported.

Spring application of the sulphate gave better results than a divided application in fall and spring. Good results were obtained by making the first application early in the spring with a second application 3 weeks later.

The production of ammonium sulphate in 1908, C. G. ATWATER (*Amer. Fert., 31 (1909), No. 2, pp. 10–12*).—The world's production is given as 895,550 metric tons, of which 325,228 tons was produced in Great Britain and 313,000 tons in Germany.

Manufacture of saltpeter, F. E. DRUMMOND-HAY (*Diplo. and Cons. Rpts. [London], Ann. Ser., 1909, No. 4278, p. 10*).—This is a brief account of progress in the construction and the probable capacity of various Norwegian works for the manufacture of lime nitrate, nitric acid, and other products.

The new nitrogen manures, H. VON FEILITZEN (*Abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 13, pp. 723, 724*).—A note is given on a paper presented at the International Congress of Applied Chemistry at London, in which experiments with calcium nitrate and calcium cyanamid carried on by the Swedish Moor Culture Society at Flahult since 1904 are summarized (E. S. R., 20, p. 319; 21, p. 121).

The importance of nitrogen fixation from the standpoint of technical chemistry (*Deut. Landw. Presse, 36 (1909), No. 56, p. 608, dgm. 1*).—This is a brief account containing a diagram showing the numerous applications of nitric acid in agriculture and industry.

Nitrated limestone of North Caucasus, M. GLASENAPP (*Rigasche Indus. Ztg., 35 (1909), p. 2; Engrais, 24 (1909), No. 22, pp. 600, 601; abs. in Chem. Ztg., 33 (1909), No. 61, Repert., p. 279*).—It is reported that samples of calcareous material were found in this region which contained from 9.7 to 47.8 per cent of nitrate of potash. Attention is especially called to the value of this material for the manufacture of calcium cyanamid.

Notes on nitrate of soda, J. C. DE RUIJTER DE WILDT (*Cultura, 21 (1909), No. 252–253, pp. 477–481*).—The author calls attention to the importance of the high potash content often found in nitrate of soda. Analyses of 49 samples are given in which the percentage of potash ranged from 0.5 to 5.6, 34 samples having over 2 per cent.

Ammonia and nitrate in potash deposits, W. BILTZ and E. MARCUS (*Ztschr. Anorgan. Chem., 62 (1909), No. 3, pp. 183–202, pls. 2, figs. 5; Kali, 1909, pp. 189–194; abs. in Chem. Ztg., 33 (1909), No. 81, Repert., p. 358*).—Using the ordinary colorimetric method, the authors found in 10 gm. of salt from Stassfurt and Vienenburg deposits an average of 0.016 mg. of ammonia, much less than is found in sea water at the present time. No nitrites were found in the Stassfurt salts, but considerable amounts of nitrate were shown to be present by the method of reduction with sodium amalgam. The nitrate was strongly localized in the middle layers of saline clay. The authors consider this nitrate to be an evidence of former organic life.

The occurrence of potash salts in northern Chile, F. SETZ, F. GOLDENBERG, and J. TORRES (*Abs. in Chem. Ztg., 33 (1909), No. 61, Repert., p. 279*).—The occurrence of salt deposits near Iquique in North Chile, which contain 3 to 4 per cent of potassium chlorid, is reported.

The discovery of deposits of potash salts in Upper Alsace, L. GRANDEAU (*Jour. Agr. Prat., n. ser., 17 (1909), No. 24, pp. 747, 748; 18 (1909), No. 26, pp. 11, 12*).—Important deposits recently discovered near Wittelsheim are briefly described.

Soil potash, G. S. FRAPS (*Abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 13, pp. 721, 722*).—This is an abstract of a paper read at the International Congress of Applied Chemistry at London, reporting a study of the solubility of the potash in various minerals, such as nephelite, leucite glauconite, biotite, microcline, orthoclase, and muscovite.

Wide variation in solubility in strong acids and other solvents was observed. Potash absorbed by zeolites was found to be readily soluble in fifth-normal

nitric acid, but was not completely removed. Some of the potash dissolved by fifth-normal nitric acid was removed from solution by fixation in the soil, but the percentage of fixation was in no case large.

Orthoclase, mica, and nepheline as sources of potassium for plants. D. N. PRIANISHNIKOV (*Abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 13, p. 722*). In this abstract of a paper presented at the International Congress of Applied Chemistry at London it is stated that plants can assimilate very little potash from orthoclase and microcline even when finely powdered, but that mica, and to a still greater extent, nepheline are valuable sources of potash, about 17 per cent of the potash of the mica and 25 per cent of that of the nepheline rock being assimilated by plants.

Influence of calcium carbonate and ammonium sulphate on the assimilation of phosphoric acid [by plants] from different sources. D. N. PRIANISHNIKOV (*Abs. in Jour. Soc. Chem. Indus., 28 (1909), No. 13, p. 722*).—An abstract is given of a paper presented at the International Congress of Applied Chemistry at London in which investigations were reported tending to show that the addition of calcium carbonate produced a marked decrease in yield when applied with bone meal, raw phosphate, and pure tricalcium phosphate on sandy soils in connection with calcium nitrate or other nitrates, and no increase when used with basic slag, acid phosphate, and dicalcium phosphate.

Different results were, however, obtained when the nitrate was replaced by ammonium sulphate, which decomposes phosphates, the most marked effect being produced when half of the nitrate was replaced by the sulphate. When ammonium sulphate was used alone the plants were injured by the physiological action of the acid condition produced in the soil, although they were supersaturated with phosphoric acid. The injury from this cause was reduced by the application of a small quantity (0.25 per cent) of calcium carbonate and the yield was increased. When the amount of calcium carbonate was increased to more than 1 per cent all of the free sulphuric acid was neutralized and the plants suffered from phosphoric acid starvation. The effect of the different methods of treatment was apparent not only in the yield of crops but also in their content of phosphoric acid. See also a previous note (E. S. R., 21, p. 24).

Fertilizer experiments with increasing amounts of Thomas slag. A. IMELMANN (*Deut. Landw. Presse, 35 (1908), No. 63, pp. 667, 668, figs. 3; abs. in Zentbl. Agr. Chem., 38 (1909), No. 5, p. 356*).—In the experiments reported Thomas slag was used in amounts of 400, 600, 700, and 800 kg. per hectare (from 356 lbs. to 712 lbs. per acre) on rye and oats in connection with a basal ration furnishing potash and nitrogen.

The yield, the profit, and the after effect increased with the increase in the application of slag. The results of the experiments indicate in general that slag is the cheapest form of phosphoric acid for light sandy soil.

Phase relationships of the calcium phosphates and bearing upon certain agricultural and biological problems. H. BASSETT, Jr. (*Abs. in Chem. Ztg., 33 (1909), No. 69, p. 626; Jour. Soc. Chem. Indus., 28 (1909), No. 13, p. 722*).—This is a note on a paper read at the International Congress of Applied Chemistry at London, reporting investigations which the author has been carrying on for some time on the three-component system, $CaO—P_2O_5—H_2O$, and which has enabled him to scale a solid model of the region of orthophosphates.

The results of the investigation throw light on the conditions under which various mineral phosphates have been formed and on the nature of the naturally-occurring so-called tricalcium phosphates, as well as on the condition in which phosphoric acid is present in the soil. It is stated that it is probable that the available phosphoric acid of the soil is in large part in the form of tetracalcium phosphate. The same is true of the phosphorus of Thomas slag, and this fact

explains the good results obtained from the use of slag as a fertilizer. The paper also deals with the nature of the mineral constituents of bones and shows that the bone phosphate is a mixture of tetracalcium and tricalcium phosphate, both of which are in hydrated condition.

A new deposit of phosphate of lime, A. CHAVARD (*Jour. Agr. Prat., n. scr., 17 (1909), No. 25, p. 779*).—An important deposit of nodular phosphate suitable for the manufacture of superphosphates which has recently been discovered in the Department of Aude is described and an analysis given.

Phosphate (*Ann. Rpt. Mineral Prod. Canada, 1906 [pub. 1909], pp. 145, 146*).—Statistics of production and export of apatite in Canada from 1878 to 1906 are given. It is stated that at one time this mineral was mined to the extent of from 20,000 to 30,000 tons a year, but is now obtained chiefly as a by-product in the mining of mica, the amount produced being comparatively small, 850 tons in 1906.

The mineral phosphate industry, L. AGUILLON (*Engrais, 24 (1909), Nos. 40, pp. 1106, 1107; 41, pp. 1141–1145*).—The world's production of mineral phosphates in 1908 is given as 5,218,000 metric tons, of which the United States produced 2,500,000 tons and Tunis 1,258,000 tons.

The manufacture of superphosphates, L. SCHUCHT (*Die Fabrikation des Superphosphats. Brunswick, 1909, 3. rev. and enl. ed., pp. VIII+460, pls. 4, figs. 153*).—This is a third enlarged and revised edition of this important work (E. S. R., 15, p. 462). The information has been brought up to date and a considerable amount of new matter added, including chapters on the utilization of nitrogenous industrial by-products, the utilization of the nitrogen of the air, methods of analysis of fertilizers as adopted by the German Association of Fertilizer Manufacturers in 1907, a review of investigations in the field of fertilizer manufacture, and a select bibliography.

The formation of oceanic salt deposits, J. H. VAN'T HOFF (*Zur Bildung der Ozeanischen Salzablagerungen. Brunswick, 1909, pt. 2, pp. VI+90, figs. 15; rev. in Chem. Ztg., 33 (1909), No. 82, p. 750*).—This completes the account in book form (E. S. R., 17, p. 111) of van't Hoff's work on the formation of oceanic salt deposits. This second part deals with lime salts and borates.

On catalytic fertilizers, G. BERTRAND (*Abs. in Chem. Ztg., 33 (1909), No. 71, p. 653; Jour. Soc. Chem. Indus., 28 (1909), No. 13, p. 724*).—This is a note on a paper presented before the International Congress of Applied Chemistry at London.

Investigations are reported on such substances as manganese, zinc, boron, fluorin, etc., which occur as a rule only in traces in soils and which in the author's opinion affect the fertility of the soil by catalytic action. It is recommended that manganese sulphate at the rate of 50 kg. per hectare (44.5 lbs. per acre) and carbonate at 4 to 5 times this rate be employed as a fertilizer, preferably in mixture with manure.

The fertilizing value of peat, H. D. HASKINS (*Jour. Amer. Peat Soc., 1 (1908), No. 2, pp. 23–26*).—This discussion of the fertilizing value of peat is based upon analyses of a large number of samples of peat from Massachusetts.

It is pointed out that the percentage of mineral matter in peat is too small to be of any particular significance and that the fertilizing value is due mainly to the nitrogen present. Artificial digestion of peat in permanganate solution indicates that only about one-fourth of the nitrogen present is in immediately available form. A much larger proportion, however, is believed to become available as a result of slow decomposition in the soil.

Composition of volcanic clay from Java, J. M. VAN BEMMELEN (*Chem. Weekbl., 6 (1909), Nos. 13, pp. 199–215; 15, p. 254; Ztschr. Anorgan. Chem., 62*

(*1909*), *No. 3, pp. 221–236; abs. in Jour. Chem. Soc.* [*London*], *96* (*1909*), *No. 559, II, p. 428*).—A technical-chemical study is reported.

The use of molasses as a fertilizer. P. Boname (*Sta. Agron. Mauritius Bul. 20, 1909, pp. 21–24*).—Experiments to determine the fertilizing value for sugar cane of "molascinder," which is a mixture of molasses, ashes, scum, and other residue of sugar making, are reported.

It is stated that the molasses in the mixture used contained 2 per cent of potash and 0.35 per cent of nitrogen, and the scum 2 per cent of phosphoric acid and 0.8 per cent of nitrogen. The material was therefore comparatively rich in potash and gave best results when supplemented with phosphatic and nitrogenous fertilizers. The results on sugar cane indicated a greater benefit than could be ascribed to the fertilizing constituents applied, and this increased benefit is attributed to the action of the molasses in promoting the activity of beneficial soil bacteria.

Annual report on fertilizers, B. B. Ross (*Bul. Agr. Dept.* [*Ala.*], *No. 29, pp. 125*).—This report contains analyses of fertilizers and cotton-seed meal inspected during the year ended July 31, 1909, as well as lists of fertilizer licenses issued, number and names of brands of fertilizers registered, and the texts of the State fertilizer and cotton-seed meal laws. The bulletin also contains an article giving general information regarding the composition and sources of fertilizers, the composition of the cotton plant at various stages of growth and at maturity, and the fertilizer requirements of the cotton plant.

Inspection and analyses of commercial fertilizers on sale in the State. W. F. Hand et al. (*Mississippi Sta. Circs. 20, pp. 3–15; 21, pp. 3–19; 22, pp. 3–24; 23, pp. 4–20; 24, pp. 3–21*).—The results of analyses of samples of fertilizers inspected from 1905 to 1907 are reported.

Commercial fertilizers and poisonous insecticides in 1908–9. G. S. Fraps (*Texas Sta. Bul. 123, pp. 5–17, fig. 1*).—This bulletin reports the results of the control work with fertilizers and insecticides in Texas during the season of 1908–9, with explanations of the principal features of the fertilizer and insecticide law of the State, valuation of fertilizers, the conditions under which free analyses are made, directions for taking samples, and results of the analyses of fertilizers. The amount of fertilizer, exclusive of cotton-seed meal, sold in Texas from September 1, 1908, to May 1, 1909, is estimated at 23,800 tons. The average selling price per ton during this period was $26.22 per ton as compared with $29.07 per ton during the preceding season. The average valuation was $20.55 per ton as compared with $22.05 during the preceding season.

AGRICULTURAL BOTANY.

Plant food removed from growing plants by rain or dew, J. A. Le Clerc and J. F. Breazeale (*U. S. Dept. Agr. Yearbook 1908, pp. 389–402*).—Accounts are given of the authors' investigations, together with a review of previous work on this subject.

Preliminary to the main investigation, experiments were carried on in the translocation of plant food in the wheat plant, the studies being made in a series of Wagner pots and samples analyzed for nitrogen, potash, and phosphoric acid. From these experiments it was shown that there was a migration of plant food from the dead to the living tissue, and that the nitrogen and phosphoric acid were transferred toward the seed, whereas the potash remained for the most part in the stem and leaves. The loss of plant food, instead of being a physiological or biological process, is held to be simply a mechanical one, due to the action of rain, dew, etc.

To definitely determine the effect produced by these agencies, experiments were carried on with various plants and the leaching conducted under different conditions, simulating rainfall and dew as nearly as possible. Among the plants experimented with were barley, rice, wheat, oats, and potatoes.

The general conclusions from the investigation show that, on ripening, the salts held in the sap of the plants migrate from the dying toward the living tissues in an upward and not a downward direction, there being little evidence to show excretion through the roots into the soil. The plants were found to exude salts upon their surfaces, and the rain washed these salts back into the soil. As a consequence of this action, analyses of plants for ash ingredients may give misleading results when it is desired to determine the amount of plant food absorbed by or essential to plant growth, unless the leaching action of rain and dew be considered.

The transpiration in young seedlings, J. Y. BERGEN (*Bot. Gaz., 48 (1909), No. 4, pp. 275–282, fig. 3*).—Investigations on the adaptation of transpiration to changed environment on the part of young seedlings are reported. The studies were carried on with a number of species of plants and the transpiration ratios determined.

As a result of the experiments it was found that plants growing in a highly humid atmosphere acquired a capacity much greater than normal for transpiration in a moderately dry atmosphere. Different families and different genera of the same family vary in their capacity to acquire a tendency to extremely rapid transpiration. The ratios of transpiration for the same species become noticeably greater as the leaves become fully developed. The transpiration ratios are not necessarily greater when the relative humidity of the air is very low than when it is of medium value.

Vitality and the transmission of water through the stems of plants, H. H. DIXON (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1909), No. 3, pp. 21–34, figs. 3*).—A report is given of investigations made to demonstrate that the force required for the transpiration current of plants is not as great as that claimed by some investigators. The author studied the rate of movement of water through stems of *Syringa vulgaris*. Special precautions were taken for the elimination of error, and after testing two shoots as nearly similar as it was possible to obtain, one was killed by subjecting it to steam or poison and the transfer of water noted.

The experiments and observations, the author believes, indicate that vital actions on the part of the stem are not needed to assist the transpiration current, and that the anatomical relations of the cells of the stem to the conducting tubes are also not in accord with the view that they can apply any elevating force.

The absorption of water by seeds, W. R. G. ATKINS (*Sci. Proc. Roy. Dublin Soc., n. ser., 12 (1909), No. 4, pp. 35–46, dgms. 4*).—The author has made an attempt to discover the forces which cause water and salt solutions to enter dried seeds, in order that some light might be thrown on the condition of latent life existing in them. Seeds were immersed in water and various salt solutions and their increase in weight determined. The permeability of the seeds was also investigated. By volumetric methods changes in concentration of the solutions were determined.

Seeds of beans and sweet peas were used, and the results obtained show that bean seeds whether living or dead take up the same quantity of water in their initial stages. The final weight reached by the seeds is independent of the presence of potassium nitrate, except in so far as the salt alters the density of the water. The rate at which distilled water is taken up is no greater than that at which salt solutions are absorbed. Seeds placed in potassium nitrate

solutions and then in pure water lose weight, their final weight being the same as it would have been had they been placed directly in pure water. Seeds placed in normal sulphuric acid, decinormal iodin, and decinormal sodium chlorid produce no concentration of these solutions.

These facts are held to prove that there is no semipermeable membrane in bean seeds until germination begins, when the cell protoplasm acts as such, and that there is no difference in absorption between living and dead seeds until after germination. The forces concerned are capillarity and imbibition in the initial stages and osmosis after germination.

Carbon dioxid may be detected with living seeds or with those killed by chloroform, the evolution of the gas being noticeable in less than 2 hours after the air-dried seeds have first been moistened.

The temporary suspension of the vitality of certain seeds, P. Becquerel (*Compt. Rend. Acad. Sci.* [*Paris*], *148* (*1909*), *No. 16, pp. 1052–1054*).—The author gives an account of an experimental demonstration of the complete arresting of the vital function of seeds without impairing their germinative ability. In the experiments a number of mustard, alfalfa, and wheat seeds were dried at a temperature of 40° C. for 6 months, placed in small glass tubes from which the air was exhausted, and later submitted for 3 weeks to the temperature of liquid air, followed without any warming by a 77 hours' immersion in liquid hydrogen at —253°. The seeds were then taken from the tubes and germinated on absorbent cotton at a temperature of 28°.

All the seeds of mustard and alfalfa germinated in a few days, and 4 out of 5 of the wheat grains did likewise. It seems that the protoplasm retained its vitality in the absence of moisture and oxygen, in vacuum, and at temperatures approximating absolute zero.

The green coloring matter of the inner seed coats of certain plants and its relation to chlorophyll, N. A. Monteverde and W. N. Lubimenko (*Izv. Imp. St. Petersb. Bot. Sada* [*Bul. Jardin Imp. Bot. St. Petersb.*], *9* (*1909*), *No. 2–3, pp. 27–44, figs. 5*).—Studies have been made of the green coloring matter found in the seed coats of many plants.

Out of nearly 900 species representing 110 families of plants, 18 families were found to show the green color in their seed coats. Among the families thus characterized the cucurbits were found to be conspicuous, and the nature of the coloring matter has been investigated. In the cucurbit seeds the green color begins to show late in the development of the seed, in fact often not until the seed has attained almost normal size. Studies of the alcoholic and ether extracts showed that the coloring matter is similar to protochlorophyll in etiolated leaves. Under the influence of light, green coloring matter in the living cells of the seed coats may become transformed into chlorophyll.

On the nature of anthocyanin, Miss M. Wheldale (*Proc. Cambridge Phil. Soc., 15* (*1909*), *No. 2, pp. 137–168; abs. in Jour. Chem. Soc.* [*London*], *96* (*1909*), *No. 561, II, p. 604*).—Investigations have been made on the coloring matter of plants, the studies including a large number of species.

The author concludes that chromogens which are pale or deep yellow in color are of the nature of the flavone and xanthone classes of natural coloring matters, and are widely distributed in plants and commonly found in connection with the pink, purplish-red, and purple series of anthocyanic pigments. These chromogens probably exist in the plant as glucosids. Recent work of Palladin is said to indicate that chromogens of an aromatic nature are widely distributed and are able to produce red and purple pigments when acted upon by peroxydase in the presence of available oxygen.

Experiments in crossbreeding plants have shown that for the production of anthocyanin two bodies are essential, an aromatic chromogen of the flavone

series and a reddening factor, which in all probability is an oxidizing ferment. Pink, purplish-red, and purple which arise from successive oxidation stages of the aromatic chromogen are the more common forms of anthocyanin. Albinos result from the absence of the chromogen or the peroxidase. The bluing enzyms are said to depend on the presence of both these factors.

An extensive bibliography of the literature of flower colorings is given.

The demonstration of the formation of starch in leaves, SOPHIA ECKERSON (*Bot. Gaz., 48 (1909), No. 3, pp. 224–228*).—A qualitative demonstration in photosynthesis is reported, in which the time required for the disappearance of accumulated starch and that required for its subsequent demonstrable formation is recorded. The results are tabulated, showing the time required in darkness to empty the leaves of starch, the time in diffuse light to make enough starch to show clearly defined figures with the iodin test, and the time required to show sharply defined dark figures, together with the necessary interval required for the iodin to produce its full effect.

Of about 30 species of plants studied the best for showing the disappearance and reapparence of starch were *Pelargonium hortorum zonale*, *Fuchsia speciosa*, *Senecio mikanioides*, *Impatiens sultani*, and young plants of sunflower, castor bean, common beans, maize, and pumpkins.

In connection with these studies the effect of temperature on the amount of starch was quite apparent. The optimum temperature for photosynthesis was found to be about 20–22° C. In some of the experiments less starch was found at the end of hot afternoons than in the early morning. The explanation for this phenomenon is that translocation from the leaf into the stem increases with rising temperature more rapidly than photosynthesis.

Utilization of nitrogen in air by plants, III, T. JAMIESON (*Agr. Research Assoc. [Scot.] Rpt. 1907, pp. 9–75, pls. 4*).—This is a continuation of a previous publication (E. S. R., 19, p. 127), in which the author describes and offers evidence to confirm his theory that atmospheric nitrogen is directly assimilated by plants through certain specially developed trichomes, to which the name "nitrogen assimilators" is given.

Stimulation of storage tissues of higher plants by zinc sulphate, BERENICE SILBERBERG (*Bul. Torrey Bot. Club, 36 (1909), No. 9, pp. 489–590, figs. 4*).—The effect of zinc sulphate on the storage tissues of a number of plants was investigated. In weak solutions it had a stimulating effect, while in stronger ones it proved injurious.

Normal solutions and fractional normal solutions were tested on a large number of plants. It was found that beets, sweet potatoes, kohl-rabi, potatoes, and salsify were the most satisfactory subjects of experimentation. The effect of the chemical on the tissues and also on the respiration was investigated, and zinc sulphate was found to have a stimulating effect upon the respiration of storage tissues when used in sixteenth-normal solutions. Fourteenth-normal solutions or any stronger than those were found to inhibit the respiration of storage tissues of potatoes.

The influence of chemicals in stimulating the ripening of fruits, A. E. VINSON (*Science, n. ser., 30 (1909), No. 774, pp. 604, 605*).—In continuation of the author's studies on the ripening of dates (E. S. R., 20, p. 659), a preliminary account is given of recent investigations in which it was found that the perfect ripening of seedling dates could be effected in 3 days or less by subjecting the fruit to the vapor of acetic acid for 12 or 15 hours. At the end of this time the fruits have become transparent nearly to the seed and will then ripen naturally without further treatment. The process, it is said, can be accelerated by exposing them to the sunshine or by heating for some hours to 45° C. It is believed that this process will permit the shipping of green dates and ripening them at their destination, as bananas are now handled.

By moderate treatment with acetic acid the tannin of the date was not rendered entirely insoluble, but the astringency disappeared in a few hours. The intracellular invertase passes into solution immediately after the treatment, and probably other catalytic agents are simultaneously released.

The ripening processes were found to be initiated not only by the acetic acid, but also by other chemicals, such as acetic ether vapor, soaking for some hours in a solution of potassium acetate, etc.

Notes on the effect of mechanical pressure on the roots of Vicia faba, Louise H. Gregory (*Bul. Torrey Bot. Club, 36 (1909), No. 8, pp. 457–462, figs. 4*).—Studies are reported on the effect of mechanical pressure on the roots of *V. faba*, the object of the investigation being to determine the effect of pressure on the mitotic figure, and also the morphological changes that take place in compressed root cells. The investigation was carried on principally with roots of *V. faba*, although those of maize and sunflower were also treated, with rather poor results.

In the different experiments the time of compression and the amount of pressure varied, and a number of morphological phenomena were noticed taking place in the cells of the compressed roots. In all cases splits or rifts were observed in some stage of formation in the different tissues. The beginnings of these splits were found where there was the least pressure and continued as the pressure was increased. The first indication of a definite split was the appearance of cells which had lost their entire contents, retaining, however, their cell walls. In general the protoplasm of the cells had become vacuolated and had shrunken from the wall, and in some cases the nuclei showed signs of abnormality.

In the second group of experiments, in which the pressure varied from 1,000 to 1,400 gm., the plerome cells were still more vacuolated and definite splits had appeared not only in the external layer of plerome cells but also throughout the central portion. In the third group of experiments, where the amount of pressure was still greater, the plerome cells were broken up and the splits were even more pronounced.

It is concluded that although certain changes are produced by the compression, not even a maximum amount of pressure nor an absolute change in environment would entirely stop or affect the normal development of the cells.

The influence of traction on the formation of mechanical tissues in stems, J. S. Bordner (*Bot. Gaz., 48 (1909), No. 4, pp. 251–274*).—This is a detailed report of investigations a preliminary account of which has already been given (E. S. R., 21, p. 318).

Light-perception organs of leaves, O. Damm (*Naturw. Rundschau, 24 (1909), Nos. 31, pp. 389–391, figs. 5; 32, pp. 407–409*).—A critical summary is given of investigations by a number of authors relating to light perception on the part of plants, the work being largely based upon that of Haberlandt.

International catalogue of scientific literature. R—Bacteriology (*International Cat. Sci. Lit., 7 (1909), pp. VIII+771*).—A catalogue is given of the literature of bacteriology (including yeasts and molds) and parasitic protozoology, over 6,000 titles being reported.

FIELD CROPS.

[Work with field crops at the Alaska stations], J. W. Gasser, J. W. Neal, and C. W. H. Heideman (*Alaska Stas. Rpt. 1908, pp. 33–41, 44, 45–49, 52–55, pls. 3*).—Brief notes are given on culture tests with numerous varieties of grains, grasses, and potatoes at the Rampart, Fairbanks, and Copper Center stations.

At Rampart, wheat, rye, and emmer, among the fall sown grains wintered perfectly but barley and oats were not successful. Excelsior rye produced well-filled heads with large plump grains, attained a height of 60 in., and was ripe September 5. The heads of emmer were large and well filled and the straw was of good length. This grain stood up well and was cut when not quite fully ripe on September 9. Among the promising spring grains at Rampart was a variety of barley secured from Eagle, Alaska, and apparently identical with barley No. 18922. This produced a fine, even growth and was ripe August 14. Twelve varieties of Scandanavian and Russian barleys, grown for the first time, were the earliest varieties but showed a tendency to lodge. Probsteier oats S. P. I. No. 20461 and White Probsteier S. P. I. No. 20462 were matured September 10. Ligowo S. P. I. No. 20459, and Banner, Swedish Select, Burt Extra Early, Finnish Black, and Sixty-day, grown from station seed, also gave promising results. Russian buckwheat from station seed seeded May 22, began to bloom June 22, and was harvested August 20, yielding a fair crop of well-ripened grain. Among 35 varieties of potatoes, the largest percentage of first-grade tubers was produced by Early Market, Snow Flake Junior, Extra Early Triumph, Early Ohio, and Irish Cobbler. The seed of all the varieties mentioned with the exception of Snow Flake Junior, which came from Skagway, was secured from the Sitka Station.

At Fairbanks, barley No. 279 ranked first in ripening. Hanna barley No. 5793 from South Dakota was ripe enough for hay August 15, and ripe enough for harvest August 25. Manshury, Hull-less No. 19851, Hanna No. 5793, Hull-less No. 12709, and Beardless No. 19852, in their respective order, ripened after barley No. 279. Sixty-day oats and oats No. 19851 ripened about together, being matured by August 25. These varieties were followed in ripening by Finnish No. 20459 and No. 20460. Rye No. 280 from South Dakota seeded May 25, was in full head July 15, stood from 36 to 46 in. high, and was harvested September 3, with the seed fairly well matured.

A brief review is given of the pedigree plant breeding carried on at the Copper Center Station. The work of crossing Pamir S. P. I. No. 18922 barley with Champion is reported. Of 20 seeds obtained from this cross, 17 grew and 2 of these resembled Champion, 5 of them were bearded, 1 hull-less, 5 of them black, 1 failed to mature seed, and the rest were early and quite promising. This offspring appears more promising for Alaska than either of their parents. A barley secured at Coldfoot and named Chittyna has made excellent growth at the station. A gray or nearly white sport of Finnish Black oats, discovered in one of the pedigree beds, is also giving satisfactory results.

The injury to wheat by frost on July 21 was greater in every case than the injury to barley and oats. Among the barleys, Pamir S. P. I. No. 18922, Champion, and Manshury, grown from station seed, matured. It is stated that Pamir has but one quality, earliness, to recommend it, and that the Russian variety, No. 20786, is better. Yakutsk has a good performance record and Champion and the new beardless hybrids are the most promising of all. Finnish Black oats S. P. I. No. 15857, matured at the station and a sport of Finnish Black, a vigorous white-seeded variety, also gave good results. Wild oats from the Minnesota Station made a very vigorous growth.

[Work with field crops], F. W. Taylor (*New Hampshire Sta. Rpts. 1907–8, pp. 312–319*).—The work conducted in the department of agronomy is briefly summarized.

The corn breeding work now in progress for 2 years is described and mention is made of the fact that during the last year, a most unfavorable one for corn, the yields from 50 selected ears varied from 11 to 27 bu. per acre. Ten varieties of oats yielded from 40 to 68 bu. per acre and varied in weight per bushel from

29 to 34.5 lbs. Long White Tartar oats proved the best variety. A plat of winter wheat produced 30.75 bu. of grain and 2,580 lbs. of straw per acre as compared with 18.2 bu. of grain and 3,010 lbs. of straw for spring wheat.

The plan of a grass fertilizer experiment begun in 1907 and to be in progress until 1912 is presented and results with fertilizing old sod land are reported. Plats of 4-year-old sod received different fertilizer treatment. The first received a mixture of 150 lbs. of nitrate of soda, 100 lbs. of acid phosphate, and 50 lbs. of muriate of potash at the rate of 300 lbs. per acre; the second received nothing; the third, nitrate of soda at the rate of 300 lbs.; and the fourth, barnyard manure at the rate of 12 tons. This treatment was given in 1904 and 1905, but in 1906 no fertilizer or manure of any kind was applied. It was found that the complete commercial fertilizer gave a very fair return but was not persistent and that nitrate of soda alone was used at a loss. Barnyard manure proved to be a good top dressing for grass land and showed a persistent effect.

A table is given summarizing the results of seed inspection in 1908. The seed examined included samples of timothy, redtop, red clover, alsike clover, and alfalfa.

Further results in a rotation of potatoes, rye, and clover, H. J. Wheeler and G. E. Adams (*Rhode Island Sta. Bul. 135, pp. 101–126*).—Earlier results of this experiment have been previously noted (E. S. R., 12, p. 1030). The rotation consists of winter rye the first year, clover or clover and grass the second year, and potatoes the third. The work has now been in progress 12 years and this bulletin has reference mainly to the last 6 years of this period.

On an average for the whole period of 12 years, plat No. 11 received per acre 54.6 lbs. of potash, 91.6 lbs. of phosphoric acid, 27.2 lbs. of nitrogen, and 250 lbs. of lime; plat No. 14, 58.2 lbs. of potash, 90.4 lbs. of phosphoric acid, 26.9 lbs. of nitrogen, and 232 lbs. of lime; and plat No. 13, 67.7 lbs. of potash, 87.2 lbs. of phosphoric acid, 27.1 lbs. of nitrogen, and 232 lbs. of lime each year.

Previous work (E. S. R., 7, p. 760) had shown that the proportion of merchantable tubers in the potato crop is greatly increased by liming, even sometimes in cases where the total yield remains the same. The results secured indicate that after the 3-year rotation is well started, further liming once in 6 years at very moderate rates will be sufficient.

The general improvement of the soil was found to have far less beneficial effect upon the rye crop than upon potatoes and clover. With the improvement in the soil it was necessary to omit nitrogenous top-dressings for rye, with the result that the yields of straw were somewhat lessened and those of grain increased. The experiment also taught that it is advisable to sow grass seed with the clover, as grass usually more readily survives under extreme winter and excessive dry summer conditions. No success was secured in trying to grow clover without first applying lime or wood ashes to the land.

As calculated by the authors, the net returns per acre during the first 6 years were $279.40 and during the second 6-year period $371.46 or $92.06 in favor of the last 2 rotations.

Effects of manures throughout rotations of crops, D. A. Gilchrist (*County Northumb., Ed. Com., Bul 13, pp. 34–41*).—Barnyard manure was considerably more valuable than commercial fertilizers for the light soil on which the experiments were made, although both gave satisfactory results. The manure produced practically as heavy crops of roots as manure and commercial fertilizers used together but the combination considerably improved the three following crops. The best results were obtained by using manure alone for swedes and a complete commercial fertilizer application for hay. The rotation included cereal, root, and hay crops.

Double dressings of manure, amounting to 20 tons in 4 years, increased the crops without increasing the net gains. It was found that commercial fertilizers, especially superphosphate, must be applied in excess. When potash was excluded from the application, commercial fertilizers gave but small gains and the good results secured where manure alone was used show that a moderate dressing largely made up the potash deficiency of the light land. Sulphate of ammonia had singularly exhausting effects on succeeding crops.

Feeding off the swedes by sheep on this land apparently encouraged the finger-and-toe disease, and this reduced the following swede crop. Linseed cake fed to the animals when eating off the roots greatly increased the cereal crop immediately following but influenced the second crop to only a small extent.

[Work with field crops], D. A. GILCHRIST (*County Northumb., Ed. Com., Bul. 13, pp. 42–63*).—On an average for 3 years, Banner, Thousand Dollar, and Sensation, all Canadian sorts, were the leading varieties of oats under test, the yields being 65⅛, 62¼, and 61 bu. per acre respectively. Payrent and Beseler Prolific oats also gave good results.

Chevalier barley grown at Cockle Park since 1903 gave considerably better yields in 1908 than either of the three Chevalier barleys the seeds of which had been recently changed. Similar results were also secured with Goldthorpe barley.

In the wheat trials, Squarehead Master for 2 years gave the largest average produce of both grain and straw with Scholey Squarehead ranking next.

The results with beans are considerably in favor of the Scotch Horse beans which were more vigorous and gave the heaviest crops of both grain and straw. In a fertilizer test the Scotch Horse bean gave much heavier yields than the Norfolk Tick bean, and the use of 6 cwt. of basic slag was more satisfactory than the use of superphosphate. The application consisting of 10 tons of manure, 6 cwt. of slag, and 1 cwt. of muriate of potash per acre gave the best results, while the same application with the manure omitted ranked next in efficiency.

The clovers from English seed proved more vigorous and lasting at Cockle Park than those from seed from abroad, and Italian rye grass from English seed did better than that from French seed.

On an average for 4 years, Mammoth Long Red mangel produced 21 tons and 19 cwt. of roots per acre as compared with 20 tons and 19½ cwt. for Prize-winner Yellow Globe. In 1908, 352 plants of Mammoth Long Red, 108 of Prize-winner Yellow Globe, and 68 of Golden Tankard per acre produced seed the first year. The results of fertilizer experiments indicated that nitrate of soda had an advantage over sulphate of ammonia for mangels, that basic slag is better than superphosphate, and sulphate of potash better than muriate of potash. It was found profitable to apply a complete fertilizer together with barnyard manure. The use of 2 cwt. of common salt per acre increased the mangel crop by over 3¾ tons, but both lime and lime mud decreased the yield of roots. Yields of swedes and turnips are also recorded and the percentages of dry matter in swedes as shown in analyses of 4 varieties during the past 6 years are given in a table.

Summary of agricultural experiments (*Jour. Bd. Agr. [London], 16 (1909), No. 6, pp. 489–497*).—A summary of miscellaneous experiments with cereal, leguminous, and root crops conducted at various agricultural institutions of England and Scotland is given.

Hints to settlers on the Umatilla project, Oregon, B. HUNTER (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 495, pp. 12*).—A description of the region and its climate is given, together with discussions on clearing and seeding the land, the

immediate expenses, alfalfa growing and dairying, the growing of orchard, small fruit, and vegetable crops, the value of green-manure and cover crops, and the usefulness of wind-breaks, and a list of publications of this Department deemed of service to settlers.

The search for new leguminous forage crops, C. V. PIPER (*U. S. Dept. Agr. Yearbook 1908, pp. 245–260, pls. 7*).—The need for new leguminous forage crops is pointed out, the conditions affecting the search for new species described, and the climatic conditions of different sections of this country with those of other countries are compared. The article contains descriptions of the following leguminous forage plants and discussions of their economic value: Lyon bean (*Stizolobium lyoni*), kudzu (*Pueraria thunbergiana*), guar (*Cyamopsis tetragonoloba*), the Tangier pea (*Lathyrus tingitanus*), Siberian alfalfa (*Medicago falcata*), moth bean (*Phaseolus aconitifolius*), adzuki bean (*P. angularis*), cowpea (*Vigna unguiculata*), soy beans (*Soja hispida*), Bonavist or hyacinth bean (*Dolichos lablab*), kulti (*D. biflorus*), bur clovers (*Medicago denticulata* and *M. arabica*), and vetches (*Vicia sativa, V. fulgens, V. atropurpurea,* and *V. dasycarpa*).

The selection of cotton and corn seed for southern farms, S. A. KNAPP (*U. S. Dept. Agr., Bur. Plant Indus. Doc. 485, pp. 8, figs. 6*).—Brief directions are given for the improvement of cotton and corn by seed selection. The matter presented is largely taken from publications previously noted (E. S. R., 17, p. 548; 18, p. 1120; 19, pp. 734, 836).

Alfalfa, O. M. BALL (*Texas Sta. Bul. 109,[a] pp. 3–18*).—This bulletin is a general treatise on the culture of alfalfa in Texas. The results of analyses of alfalfa seeds for 1906 are partially reported and the quantities of weed seeds found in the samples are pointed out.

New barleys (*Wchnschr. Brau., 26 (1909), No. 36, pp. 429, 430*).—A tabular description of new varieties of barley from Galicia, Moravia, Russian Poland, Bukowina, Slavonia, Hungary, and Franconia is presented.

The moisture content of the different varieties varied from 12.50 to 17.76, the protein content in the dry matter from 8.15 to 13.63, and the quantity of desirable kernels from 28.6 to 94.5 per cent. The barleys from Hungary and Slavonia were in general low in protein and moisture. In the 1,000-kernel weight of air-dry grain, Franconia barleys excelled with weights ranging from 45.6 to 48.8 gm.

Some factors involved in successful corn growing, C. B. WILLIAMS (*North Carolina Sta. Bul. 204, pp. 5–42, figs. 22*).—This bulletin discusses early, medium, and late maturing varieties of corn, varieties adapted to certain sections of the State, factors affecting the period of maturity, controllable factors affecting yield, and methods of improvement in general.

Cowpeas, A. M. TEN EYCK and L. E. CALL (*Kansas Sta. Bul. 160, pp. 179–209, figs. 10*).—The uses of cowpea for hay, soiling, ensilage, pasture, soil improvement, and green manuring are pointed out and the methods of growing, harvesting, thrashing, and storing the crops are discussed. Experimental results obtained by the station are also reported.

The average results for 5 years show that corn grown alone from 1903–1907, inclusive, produced 43.98 bu. per acre as compared with 47.62 bu.

[a] This bulletin must not be confused with the bulletin, also numbered by the station Bulletin 109, entitled The Determination of Cotton-seed Hulls in Cotton-seed Meal, by G. S. Fraps, issued in August, 1908, and previously noted (E. S. R., 20, p. 510).

per acre for corn with cowpeas drilled between the rows at the last cultivation.

Wheat grown continuously for 5 years from 1904–1908, inclusive, gave an average yield of 12.34 bu. per acre, while wheat grown continuously but with cowpeas as a catch crop averaged 16.61 bu. per acre. From 1904–1907, inclusive, corn was grown in rotation, both following cowpeas as a catch crop after wheat and without this intermediate green manure crop, the average yields of the corn being 50.75 bu. and 41.77 bu. per acre, respectively. The average yield of the wheat per acre amounted to 16.49 bu. where the cowpeas had been grown and 14.91 bu. where they had not been used.

Rotation experiments with corn and soy beans resulted in an average annual increase of over 14 bu. of shelled corn per acre as apparently due to the soy beans immediately preceding the corn. Wheat in rotation with soy beans or cowpeas gave an average yield per acre for 5 years of 29.83 bu. where the crop was grown continuously and of 28.39 bu. where it was alternated with soy beans or cowpeas.

During the past 6 years some 40 varieties of cowpeas and 35 varieties of soy beans have been tested for seed and hay production. Among the cowpeas Mount Olive ranked first in hay production, having produced an average of 2.68 tons of hay per acre for the 6 years, with Whippoorwill second with an average of 2.63 tons. In the average seed production for 5 years Warren New Hybrid heads the list with 13.46 bu. per acre, Black Eye second with 12.71 bu., and New Era third with 12.44 bu. These tests indicated Black Eye, New Era, and Warren New Hybrid as the best varieties for seed, Whippoorwill for hay, and New Era for a catch crop after wheat.

The results of planting cowpeas on different dates in 1905 and 1906 show that planting June 9 gave the highest yield of grain, and planting June 3 the largest production of hay. In 1904, the greatest yield of hay was produced from the June 3 planting, while the plantings made June 16 and June 28 produced the most grain. In 1905, the June 28 planting and in 1904 the July 14 planting was injured by frost.

The method of adjusting a common thrashing machine for thrashing cowpeas is described and a list of manufacturers of cowpea machinery is given.

The soy bean in the United Kingdom (*Oil, Paint and Drug Reporter, 76 (1909), No. 9, p. 16*).—This article discusses the use of the soy bean in the manufacture of soap, feeding cake, paint, varnish, edible oil, burning oil, and linoleum.

Comparative tests of sugar-beet varieties, J. E. W. Tracy and J. F. Reed (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 37, pp. 21*).—The work here described was carried on for a term of 5 years in cooperation with the New York State, Michigan, and Utah experiment stations and with private parties at Holland, Mich., and Fairfield, Wash. The Colorado Station and the Eastern Oregon Substation also cooperated with the Department for 3 years.

The experiments at the various stations were uniformly conducted to test the ability of each strain or variety to produce a paying crop under varying local conditions. At each station all plats were planted the same day and in the same manner. Tables are given showing the relative performance of varieties at the various stations and during the different years.

The greatest amount of sugar obtained in 1904 and 1905 was 4,094 lbs. per acre and the average 3,477 lbs., while in 1906 and 1907, the highest sugar obtained was 5,729 lbs. and the average 4,947 lbs. per acre. The last 2 seasons were in general much the more favorable to the growth of the crop.

The relative performance of the varieties for the entire period is shown in the following table:

Yields of sugar-beet varieties for the entire five-year period covered by the tests.

Variety.	Sources of seed.	Arranged by stations.		Arranged by years.	
		Roots.	Sugar.	Roots.	Sugar.
		Tons per acre.	*Pounds per acre.*	*Tons per acre.*	*Pounds per acre.*
Klein Wanzleben	Fairfield, Wash	15.46	5,069	14.25	4,590
Do	Klein Wanzleben, Germany	14.25	4,881	13.15	4,429
Do	Schladen, Germany	14.39	4,711	13.46	4,315
Do	Quedlinburg, Germany	14.49	4,679	13.30	4,202
Schreiber Specialitaet	Nordhausen, Germany	14.10	4,665	12.79	4,214
Klein Wanzleben	Bernburg, Germany	14.53	4,657	13.48	4,243
Do	Hadmersleben, Germany	13.95	4,642	12.59	4,101
Do	Lehi, Utah	13.95	4,603	12.72	4,147
Do	Eisleben, Germany	14.53	4,571	13.35	4,128
Jaensch Victrix	Aschersleben, Germany	13.85	4,498	12.42	3,961
Klein Wanzleben	Quedlinburg, Germany	13.57	4,490	12.52	4,068
Do	Naarden, Holland	13.01	4,364	12.16	4,018
Knauers Mangold	Grobers, Germany	12.40	3,721	11.25	3,254

The influence of self-fertilization on the degeneration of the sugar beet, K. ANDRLÍK, V. BARTOŠ, and J. URBAN (*Ztschr. Zuckerindus. Böhmen, 33 (1909), No. 7, pp. 409–418*).—The results of the experiments here reported indicated that the degenerative influence of self-fertilization varies with different individuals and manifests itself in a reduced sugar content and a prevalence of red and yellow roots. Other indications of degeneration were changes in the shape of the crown and of the root and the appearance of green crown beets.

A comparison of nitrate of soda, nitrate of lime, and nitrogen lime as fertilizers for sugar beets, J. URBAN (*Ztschr. Zuckerindus. Böhmen, 33 (1909), No. 9, pp. 535–547*).—The results of 2 years' experiments indicate that nitrogen lime is a satisfactory fertilizer for sugar beets, especially when the rainfall is sufficient, but this efficiency is not equal to that of nitrate of soda. The efficiency of nitrogen lime in 1906, when 403 mm. of rain fell during the vegetative period, was 85.6 per cent as compared with nitrate of soda, but in 1907, when only 349.6 mm. of rain fell during the growing period, the efficiency was only 75 per cent. The sugar content of the beets fertilized with nitrogen lime in 1906 was 0.35 per cent higher than that of the beets which had received nitrate of soda, while in 1907 it was 0.18 per cent lower.

The fertilizing effect of lime nitrate in 1907 was greater by 11.3 per cent than that of nitrate of soda, and the sugar content of these beets was on an average 0.16 per cent higher. The results of these experiments also show that nitrogen fertilization on soil not largely lacking in nitrogen may reduce the sugar content of the beets, while, on the other hand, if the soil is poor in nitrogen it may increase the sugar content.

The possibility of substituting nitrate of lime for nitrate of soda in sugar-beet culture, J. STOKLASA (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 8, pp. 627–636*).—The report of experiments conducted shows that the best yield of sugar beets was secured where nitrate of soda was used as a fertilizer. The beets grown with nitrate of soda were also richer in sugar than those grown with nitrate of lime. The outcome of the experiments is regarded in general as a decisive proof that nitrate of lime can not be substituted for nitrate of soda as a ferilizer for the sugar beet.

Common salt as a fertilizer for sugar beets, K. Andrlík and J. Urban (*Ztschr. Zuckerindus. Böhmen, 33 (1909), No. 8, pp. 477–485; abs. in Jour. Chem. Soc. [London], 96 (1909), No. 560, II, p. 515*).—Experiments with salt as a fertilizer for sugar beets are reviewed. The results obtained seemed to indicate to the authors that since this treatment did not cause an increase in the sodium content in the root or in the whole plant there is no danger that the use of salt as a fertilizer can be very injurious to the sugar content. Further experiments are deemed necessary to determine whether or not salt may be injurious or advantageous when used as a fertilizer for this crop.

Sodium chlorid as a fertilizer for sugar beets, H. Mette (*Ztschr. Zuckerindus. Böhmen, 33 (1909), No. 10, pp. 620, 621*).—The publication of the results noted in the abstract above induced the author to present observations made by him along the same line.

Experiments were conducted on land which had received a general application of 40,000 kg. of barnyard manure, 300 kg. of superphosphate, 200 kg. of ammonium superphosphate, and 100 kg. of nitrate of soda per hectare. Sugar beets were grown on plats 0.01 hectare in size and on some of the plats common salt was applied in August at the rate of 400 kg. per hectare (356 lbs. per acre). This application was made after continued dry weather which caused the plants to suffer from the lack of moisture.

The yield of beets on the plats receiving the salt was increased 2,312 kg. per hectare (about 2,058 lbs. per acre) over the yield on the plats not so treated. The average sugar content on the plats receiving salt was 21.48 per cent as compared with 20.58 per cent on the check plats. The authors believe that the use of salt on good soils under temperate climatic conditions with normal rainfall may not be very effective, but that very satisfactory results may be secured on the lighter soils and in warm climates. The favorable results in these experiments are attributed largely to the hygroscopic activity of the salt during the dry weather.

Estimation of the sugar-beet crop, H. Mette (*Ztschr. Zuckerindus. Böhmen, 33 (1909), No. 10, pp. 618–620*).—A record of meteorological data at Quedlinburg is presented and attention is called to the fact that during the week of September 12 with only 27 hours of sunshine and an average temperature of 12.7° C., there was an increase in the sugar content of only 0.1 per cent, while the following week there were 50 hours of sunshine, an average temperature of 11.3° C., and an increase in the sugar content of 0.9 per cent.

Variations in seedling sugar canes (*La. Planter, 43 (1909), No. 12, p. 178*).—This article discusses the variations encountered with the seedling canes D 74 and D 95.

D 74 is described as standing very erect, the stalk somewhat larger at the base than farther up, the foliage somewhat restricted, the canes rather brittle, and the stalks green in color, while D 95 has leaves rising up erect and drooping over at the extreme tip, the stalks red or purple in color, and the eyes or buds very much more prominent than in D 74. The article discusses the possibility of fixing the chief characteristics of excellence of these seedling canes by means of persistent culture.

[**Storm resistance of D 74 sugar cane**] (*La. Planter, 43 (1909), No. 15, p. 229*).—This article discusses the relative merits of cane D 74 as a storm-resistant variety. It is stated that this cane possesses a wind resistance at or near the root very far superior to its strength in the upper joints of the stalk. This strong root resistance may be a virtue in moderate storms but in violent hurricanes a great deal of damage is done through breaking of the canes.

Intensive methods and systematic rotation of crops in tobacco culture. E. H. MATHEWSON (*U. S. Dept. Agr. Yearbook 1908, pp. 403–420, pls. 5*).—This article discusses the wastefulness of early methods, present conditions, the adaptation of tobacco to intensive methods, fertilizers for the tobacco crop, effects of crop rotation on the soil, and the effects on the different crops grown in succession. The experimental results and observations described are based on material previously noted from other sources (E. S. R., 19, p. 335; 20, p. 333).

The varietal characters of Indian wheats, A. and G. L. C. HOWARD (*Mem. Dept. Agr. India, Bot. Ser., 2 (1909), No. 7, pp. II+66*).—This is a critical study in which the different characters are discussed with reference to the relation they bear to the length of the growing period and the utilization of the available soil moisture. A classification and a description of the wheats of the Punjab are given and the quality of Indian wheat and natural cross fertilization in India are discussed. A conspectus of the species of wheat is outlined.

Methods of plant breeding as tested by experiment, K. VON RÜMKER (*Methoden der Pflanzenzuchtung in experimenteller Prüfung. Berlin, 1909, pp. VII+321, pl. 1, figs. 7*).—In this work the author discusses at length the results secured during a series of years in breeding rape, rye, and wheat.

The determination of the proportion of first-grade kernels in grain, R. REGEL (*Trudui Byuro Prikl. Bot., 2 (1909), No. 3, pp. 171–177*).—The author describes and points out the advantages of a method by which the proportion of high-grade kernels in grain may be approximately determined.

From an average sample, 2 lots of 300 kernels each are taken and weighed. The difference in weight between the 2 lots should not exceed 0.3 gm. From each lot 100 of the heaviest kernels are selected and weighed, the limit of difference in weight between these 2 samples being 0.01 gm. The difference between the 100-kernel weight of the selected and the average samples is taken as indicating the degree of uniformity in the grain and incidentally the need of improving either the grain or the results already secured in this line of work. It is shown that a comparison of these 100-kernel weights points out any deficiency of the grain in weight.

Method of making germination tests, H. PIEPER (*Jour. Landw., 57 (1909), No. 2, pp. 137–147*).—The present methods of making germination tests are discussed and a new method is proposed and its advantages pointed out.

The essential feature of the proposed method is to regard kernels failing to germinate as foreign material or impurities. The following concrete examples are given for the purpose of illustration: A sample of orchard grass seed weighing 1 gm. contains 0.1 gm. of foreign seeds and the rest of the sample is composed of 1,080 filled and 120 empty kernels. Of the well-filled seeds, 112 germinated in 5 days, 780 in 6, 62 in 7, 4 in 10, 4 in 14, and 2 in 21 days, making a total of 1,000 germinated seeds or 92.6 per cent of the number of filled kernels. A factor known as energy of germination is determined from the percentage of germination at the end of 7 days, which in this case is 88.15 per cent, 952 of the 1,080 kernels having germinated within this time. The weight of the empty kernels is 0.05 gm. which, added to the weight of the foreign seeds, gives a total of 0.15 gm. or 15 per cent, thus producing a purity of the sample of 85 per cent.

According to the newly proposed method the filled seeds are not counted, but after inert matter and foreign seeds have been removed the sample is germinated and the weight of the kernels not germinating is deducted from the total weight of the sample and calculated to a percentage basis. The average

length of time required for germination is determined in the usual way. It is pointed out that by this method the difficulty of separating empty and fully developed seeds is avoided and thereby the reliability of the results in germination tests is increased. The percentage of germination is based on weight and is, therefore, more readily comparable with the quantities of seed bought and sold. Furthermore, the mathematical impossibility of comparing percentages of weight and percentages of number is avoided.

Notes on eradication of weeds, with experiments made in 1907–8, L. H. Pammel and Charlotte M. King (*Iowa Sta. Bul. 105, pp. 265–300, figs. 19*).—Notes are given on the annual, biennial, and perennial classes of weeds, the character of root systems of weeds, the dispersal of weed seeds, and on spraying machinery, and reports on experiments in weed eradication are presented.

In studying the root systems of weeds the root of common milkweed was traced for a distance of 14 ft. through the soil. The depth and spread of roots of some common weeds are shown in tables.

Early in the summer of 1908 seeds of 31 different weeds and cultivated plants were placed in horse manure and left for 5 weeks. After this treatment 1 per cent each of the seeds of chess, large ragweed, squirrel tail, curled dock, and sunflower, and ½ per cent each of the seeds of lamb's quarter, corn, and Rugel plantain germinated. In all the other samples no germinating seeds were found. The percentage of germination in samples of these seeds not so treated ranged from 8 to 98 per cent, except in the case of field thistle, with which no seeds grew from either the treated or untreated sample.

The report on the results of experiments in weed eradication is prefaced by notes on the destruction of weeds by the use of copper sulphate, sodium chlorid, carbolic acid, sulphuric acid, slaked lime, formaldehyde, corrosive sublimate, sodium arsenite, sodium arsenate, and iron sulphate. In 1907–8, 2 weedy oat fields were sprayed with a solution consisting of 100 lbs. of iron sulphate to a barrel of water. The fields were sprayed on June 20 and 21, the weather being cloudy and heavy dews following the spraying. This treatment blackened the leaves of oats to a considerable extent and was effective on mustard, greater ragweed, smaller ragweed, Pennsylvania smartweed, slender knotgrass, lamb's quarter, artichoke, Spanish dagger, and wild buckwheat. The oats recovered from spraying as did also milkweed, morning glory, cockle bur, meadow sunflower, germander, Indian hemp, pigeon grass, and foxtail. In the second field the spraying was effective on ground-cherry, cress, pepper grass, five-finger, ellisia, and evening primrose, but not effective on dock, boltonia, and meadow sunflower. A test of spraying weeds along a roadside showed that this treatment is not effective in the case of many weeds and is injurious to red clover. The results of other experiments showed that while young mustard was killed by spraying, plants which had already formed pods at that time produced seed. Greater ragweed treated with the iron sulphate solution did not average more than 2 ft. high at harvest time, while the untreated specimens were from 3 to 4 ft. high. Changing the strength of the solution indicated that the injury from double strength and half strength solutions was proportionate to the injury from the normal solution.

Observations made in the greenhouse on the growth of quack grass indicated that the larger proportion of the roots of this plant are between 2 and 4 in. below the surface, and it is concluded that deep plowing will prove an effective method of eradication. An acre of ground in a cornfield was hoed July 7, 11, 14, 18, 24, 28, and 31, August 8, 12, 17, 21, and 26, and September 2, 9, 16, 29, and 30, when practically all of the grass was killed. In a similar experiment an acre of corn ground was spaded and the quack grass roots carefully removed.

This acre was hoed August 21 and September 2, 9, 16, 23, and 30. This field was made cleaner by the treatment than the field which was simply hoed. The cost of this treatment was $12 an acre.

Weed destruction, C. BROOKS (*New Hampshire Sta. Rpts. 1907–8, p. 389*).—In 1907, wild mustard was successfully destroyed in an oat field by thoroughly spraying with iron sulphate solution when the plants were small. Two lbs. of iron sulphate were used per gallon of water and the solution applied at the rate of 50 gal. per acre. In 1908, equally satisfactory results were secured.

HORTICULTURE.

[Horticultural investigations in Alaska], C. C. GEORGESON, R. W. DE ARMOND, J. W. GASSER, and C. W. H. HEIDEMAN (*Alaska Stas. Rpt. 1908, pp. 9–14, 21–32, 41–43, 45, 49–52, 56, 65–72, pls. 2*).—A progress report on the condition of orchard and small fruits, ornamentals, and vegetables being tested at the Sitka and Rampart stations, of fruits and vegetables at the Copper Center Station, and of vegetables at the Fairbanks Station, together with several reports from settlers relative to the behavior of flower and vegetable seed received for trial. The subject-matter of this report is similar in character to that of previous reports (E. S. R., 20, p. 142).

The successful maturing of watermelons at the Hot Springs farm in the Tanana Valley is reported. These melons are grown on soil surrounding the Hot Springs. The soil, which is heated by the same source as heats the water, is sufficiently warm to permit of the successful culture of such vegetables as muskmelons, squash, tomatoes, and sweet corn.

Report of the department of horticulture, B. S. PICKETT (*New Hampshire Sta. Rpts. 1907–8, pp. 539–541*).—A brief report on horticultural operations being conducted at the station, including some data on an experiment in packing apples which indicate that New Hampshire apples well graded and packed will bring highly remunerative prices.

Hybridization in horticulture, G. BELLAIR (*L'Hybridation en Horticulture. Paris, 1909, pp. VI+339, figs. 123*).—A treatise on plant breeding, discussing the production of varieties, crosses, hybrids and races, and the practices of crossing and selection.

Consideration is first given to natural variations relative to the theories and factors of variation, adaptation, and correlation. Artificial variations are then considered, including variations produced by different cultural processes, crossing and selection. Lists are given of the principal horticultural hybrids, together with special lists of some orchid hybrids. Mendel's law, the factors involved in the production of the principal variations, the production of varieties resistant to parasitic diseases, better fruit varieties, and the improvement of cereals and certain ornamental plants, as well as graft hybrids and crosses, are also discussed.

Promising new fruits, W. A. TAYLOR (*U. S. Dept. Agr. Yearbook 1908, pp. 473–490, pls. 9*).—Historical notes and descriptions with color plates are given of the following little known or recently introduced fruits and nuts which are considered worthy of attention either for the home garden or the commercial plantation: Patten, Bennett, and Williams apples, Augbert and Champion peaches, Eaton raspberry, Peters Mango, Kawakami and Lonestar persimmons, and the Taylor, Kennedy, Hodge, Bolton and Carman pecans.

Vineyard manuring experiments in Görz-Gradiska, F. GVOZDENOVIC (*Ztschr. Landw. Versuchsw. Österr., 12 (1909), No. 8, pp. 601–626, charts 4*).—A detailed account, including the tabulated results, is given of a number of demonstration manuring experiments conducted in various vineyards in Görz

Gradiska, Austria. The results as a whole indicate thus far that chemical fertilizers not only are remunerative but also are necessary in order to attain the desired production from the vineyards.

Plant culture, G. W. OLIVER (*New York, 1909, 2. ed., rev., pp. 308, figs. 103*).—This is offered as a working handbook of everyday practice for all who grow flowering and ornamental plants in the garden and greenhouse. The methods described are based upon the many years' experience of the author. Specific directions are given for the culture of various types of plants, including stove and greenhouse plants, bedding plants, vase and basket plants, vines (hardy and tender), bulbous, water, and hardy perennial plants, as well as hardy shrubs, ornamental grasses, ferns, and lycopods. A section at the end of the work is devoted to general directions, including propagation, hybridization, potting plants, soils, mulching, and watering.

Dahlia growing made easy, J. G. LOCKLEY (*Sydney [1909], pp. 128, figs. 30*).—A brief popular treatise, in which consideration is given to the history of dahlias, detailed cultural operations, types, exhibiting and judging. A monthly working plan is also suggested, together with several lists of the best dahlias of various types.

The orchid stud-book, R. A. ROLFE and C. C. HURST (*Kew, 1909, pp. XLVIII+327, figs. 122*).—This work is intended as a guide to the literature of orchid hybridization and as a standard of nomenclature. It contains an enumeration of hybrid orchids of artificial origin, with their parents, raisers, date of first flowering, references to descriptions and figures, and synonymy, together with a historical introduction and a chapter on hybridizing and raising orchids from seed. The text is fully illustrated.

New refrigeration car, R. GUENTHER (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3566, p. 7*).—This is a brief descriptive note on a new type of refrigerator car recently invented in Germany. Methyl chlorid is used for producing cold. It is claimed that at a speed of 25 miles per hour and at 20° C. temperature of the external air, the interior of the car can be reduced to 0° in 40 or 45 minutes.

FORESTRY.

Studies on the basic principles and the systematics of the science of forestry, L. WAPPES (*Studien über die Grundbegriffe und die Systematik der Forstwissenschaft. Berlin, 1909, pp. 73*).—In the opinion of the author, what is to-day known as the science of forestry can not lay claim to being a science, either on the score of the field it covers or on its systematic arrangement. The studies here reported, and which have been under way for many years, represent the author's attempt to build up a science of forestry on definite basic principles and to develop a systematic arrangement of all scientific forestal investigations. The subject matter is discussed under the following general headings: The conception and contents of scientific forestry, the organic system of forestal discipline, and forestry and the state.

The status of forestry in the United States, T. CLEVELAND, Jr. (*U. S. Dept. Agr., Forest Serv. Circ. 167, pp. 39*).—In this circular the author outlines the present forest situation in the United States and gives an account of the work being done by the National Government and by the States to conserve their forests as well as of the advance being made in the practice of forestry by private owners of timberlands and woodlots. An appendix to the circular contains a classified list of the publications of the Forest Service, the location and area of national forests and a list of the schools of forestry.

Forest conditions in Ohio, W. J. GREEN and E. SECREST (*Ohio Sta. Bul. 204, pp. 237–277, figs. 11*).—This bulletin consists of a report of a preliminary

examination of forest conditions in the natural forests and forest plantations in the Walhonding Valley, and parts of central and southern Ohio.

The territory covered wholly or in part includes 19 counties. Consideration is given to the geology of the various sections examined, as well as to the constitution and nature of the existing stands. The present condition of several artificial forest plantations of various ages is discussed, special attention being given to catalpa plantations, this species being the one most planted on account of its rapid growth and quick availability for posts and pole material, and for windbreaks.

Out of 645,270 trees distributed by the station since 1904, 426,812 were catalpa. During the past summer data were collected on the rate of growth of a number of catalpa groves throughout the area surveyed. Considerable variation was found in groves of the same age growing in different situations. The effect of various soils, methods of pruning, different planting distances, and thinning as influencing the rate of growth is discussed. Briefer notes are also given on other important species examined.

The reclamation and reforestation of the high moors in Belgium, N. I. CRAHAY (*Bul. Soc. Forest. Franche-Comté et Belfort, 10 (1909), No. 3, pp. 214–221*).—A summarized account of the work being undertaken by the Belgian forestry department in reforesting the high moor or peat lands.

On the reforestation of culm piles and abandoned quarries, G. LÉONARD (*Ann. Gembloux, 19 (1909), No. 10, pp. 558–570, pls. 3*).—A thesis in which the author shows the possibilities of reforesting culm piles from coal mines and abandoned quarries, by giving an account of work which has been accomplished along this line in different sections of France, including the species of plants and trees best suited for these situations.

On the use of chemical fertilizers in forest plantations, A. MATHEY (*Bul. Soc. Forest. Franche-Comté et Belfort, 10 (1909), No. 3, pp. 344–346, fig. 1*).—Basic slag used alone and in conjunction with kainit, 2:1, has been tested for several years as a fertilizer in plantations of Austrian pine, Norway spruce, and of various hardwoods in the calcareous waste lands of the Burgundian hills.

The general result has been a considerable increase in growth. The effect was immediate with the spruces and the majority of the hardwoods, and was noticeable when the plants were 2 years old in the case of the pines. The maximum expense per tree is given as 1 centime (0.2 ct.), 40 to 100 gm. of the mixture being used per tree. In one case fertilized 2-year-old black pines made as much growth as unfertilized 7-year-old plants.

The German forest, M. BUESGEN (*Der Deutsche Wald. Leipsic [1909], pp. 176, pls. 2, figs. 44*).—A book popular in scope containing considerable information on the forests of Germany relative to their history, constitution, and forest operations and industries.

A statistical review of the forest administration of the Grand-Duchy of Baden for the year 1907 (*Statis. Nachw. Forstverw. Baden, 30 (1907), pp. 44+XX+139, pls. 13, dgms. 11*).—Part 1 of this review is a general consideration of the forest conditions in Baden with special reference to forestal development. The data showing forest development along various lines are portrayed in a series of colored charts.

Part 2 consists of a statistical review of the government forest administration relative to forest areas, planting and cutting operations, and yields and revenues from various forest products, together with comparative data on net revenues for the past 40 years.

In part 3 statistical data for 1907 are given for the community and cooperative forests.

Forestal and forest botany expedition to Kamerun and Togo, JENTSCH and BÜSGEN (*Tropenpflanzer, Beihefte, 10 (1909), No. 4–5, pp. IV+310, pls. 5, figs. 14, maps 2*).—An account of an expedition to Kamerun and Togo dealing particularly with forest conditions and possibilities and the forest botany of those countries.

Indian woods and their uses, R. S. TROUP (*Indian Forest Mem., Econ Products Ser., 1 (1909), No. 1, pp. II+274+CCXVIII*).—The object of this publication is to present all available information regarding those Indian woods which are used for specific purposes. Some 553 species are thus considered.

Part 1 consists of an enumeration of purposes for which woods are employed, and the woods used for each purpose. Part 2 contains condensed descriptions of the various woods mentioned in part 1, relative to their botany, physical characteristics, and chief uses. Woods used for fuel, charcoal, distillation, and similar purposes are not included. Two appendixes are given, one of which consists of vernacular names and the other of English and trade names, although where accurate identification is desired the use of botanical specimens of leaves, flowers, and fruits is advised.

The distribution and cultivation of babul (Acacia arabica) in Berar, S. NAYADU (*Indian Forester, 35 (1909), No. 9, pp. 491–512*).—A paper on this subject in which the author describes the forest region under consideration, and gives an account of *A. arabica* relative to its distribution, varieties, associates, vegetative seasons, germination and early life, later life, reproduction, uses, and injuries. The various systems of regenerating the species in Berar are also described.

Note on the pines of Lang-Bian (*Bul. Écon. Indo-Chine, n. ser., 12 (1909), No. 78, pp. 178–182, figs. 2*).—A brief descriptive account of the pine forest of Lang-Bian in South Annam.

Commercial production of balsam, A. H. FRAZIER (*Bul. Internat. Bur. Amer. Repub. [English Sect.], 29 (1909), No. 4, pp. 808–810, fig. 1*).—A brief report of the balsam industry in San Salvador, relative to the botany and distribution of the tree (*Myroxylon pereiræ*), and the preparation of the product for market.

The oil palm, S. SOSKIN (*Tropenpflanzer, Beihefte, 10 (1909), No. 6, pp. VIII+311–341, pls. 9*).—This is a contribution on the culture of the oil palm and the preparation of its products, based upon information gleaned from various sources and prepared with a view to stimulating the culture of this plant in German East Africa. Consideration is given to the botany of the oil palm, its products and their use, soils and climate, the oil palm in countries other than Africa, species and varieties, details of culture, harvesting, preparation of the products, and diseases and other enemies. The cultural directions are based for the most part on studies of native processes.

Practical manual on the culture and exploitation of rubber-producing species, both native and introduced, in the Belgian Kongo (*Manuel Pratique de la Culture et de L'Exploitation des Essences Caoutchoutifères Indigènes et Introduites au Congo Belge. Brussels: Govt., 1909, 2. ed., pp. 126, figs. 40*).—This publication is offered as a practical guide to the culture and exploitation of rubber on the Kongo. The various rubber-producing species are discussed separately under three groups—trees, vines and shrubs, relative to their botany, propagation, planting operations and subsequent treatment. The concluding section of the work contains instructions on harvesting and coagulating the latex, and the preparation, drying, packing, and transportation of rubber.

The latex of Palo Amarillo (Euforbia elastica), J. McC. SANDERS (*An. Inst. Méd. Nac. [Mexico], 10 (1908), pp. 67–74*).—This consists of notes on the Palo Amarillo rubber tree (E. S. R., 21, p. 340), relative to the chemical composition

of the latex and its exploitation as a rubber producer. The quantity of rubber in the latex is only about 10 per cent, and the product obtained by simple methods contains 50 parts per 100 of resins, which prohibits its being vulcanized. The product can be freed from the resins only by costly machinery, which the quality of the rubber does not appear to justify.

A comparison of the various processes of preserving timber, G. B. SHIPLEY (*Engin. News, 62 (1909), No. 16, pp. 396–400, figs. 2*).—This paper consists of a comparison of the Burnettizing, Wellhouse, absorption, full cell creosote, Rueping, Lowry and Card processes for preserving timber, together with a discussion of the selection of process, the required mechanical equipment, piling, shipment of treated wood, estimated cost of treatment, capacity and costs of plants. Descriptions are also given of 2 modern plants.

DISEASES OF PLANTS.

Report of the botanist for 1908, G. P. CLINTON (*Connecticut State Sta. Rpt. 1907–8, pt. 12, pp. 849–907, pls. 16*).—General notes are given on a number of plant diseases previously reported, as well as observations on others less well known, and discussions of investigations on peach yellows, chestnut bark disease, and artificial cultures of Phytophthora with special reference to the formation of oospores.

The general relation of weather conditions to plant diseases is discussed at some length, after which notes are given on the occurrence of the æcidial stage of *Gymnosporangium macropus* on the fruit of the apple, the presence of downy mildew of grapes on the ripening fruit, the abundance and injurious character of bacterial spot of peaches, a collar girdle and root injury of peaches, due in the author's estimation to winter injury, and infectious chlorosis of tomatoes.

Among the diseases not previously reported, accounts are given of smoke and gas injury to asparagus, chlorosis of beans, dry weather injury to dahlias, damping-off of beet seedlings, bacterial spot of larkspur, a disease of the common white lily that is possibly of bacterial origin, chlorosis of muskmelons that is possibly infectious, and limb gall of oaks which is thought to be of bacterial origin.

In the discussion of investigations of peach yellows and so-called yellows, attention is called to the fact that a number of different forms of injury are frequently grouped together under this one form. These include the so-called yellows, little peach, collar girdle, winter injury, drought injury, leaf fall, gummosis, etc. The author in the present article brings out the fact that many of these diseases are largely the result of the unusual weather conditions that have prevailed for some years.

The relation of weather to peach diseases is discussed, considerable winter injury being reported following the winters of 1902, 1903, and 1904. In 1907 and 1908 severe droughts occurred in Connecticut, and after the drought of 1907, moist autumn weather prevailed, setting up late growth of the dormant buds. Several theories regarding the causes of yellows are discussed at some length, but the author thinks that as winter injuries and yellows apparently come at irregular periods and seem to be associated, considerable of the loss attributed to the disease is really the result of unfavorable weather conditions.

The chestnut bark disease, attributed by Murrill and others to *Diaporthe parasitica*, is discussed at some length, and its general distribution and its distribution in Connecticut are outlined. An attempt was made to determine whether the disease was contagious by planting a number of healthy chestnut trees among diseased trees, but so far no sign of the fungus has been found. Attention is called to the fact that all the sprouts from the cut of 1906 were

badly infected, while those coming from trees cut in 1907 showed little or no disease. The author questions whether the fungus, which is generally considered a wound parasite, is responsible for all the injury, and he believes there is considerable evidence to show that winter injuries contribute very materially to the spread of the disease.

In continuation of previous investigations on artificial cultures of Phytophthora with special reference to oospores (E. S. R., 20, p. 1138), experiments have been carried on with a number of species of Phytophthora. In the previous publication reference was made to the possibility of sexual mycelia, but in the present account, which is based on more than a thousand cultures of potato and Lima bean mildews, the results seem to throw considerable doubt upon the theory. The life history of the fungi is shown on the different cultures, and the cultural methods, media, etc., are described at considerable length.

Some plant diseases of 1908, L. H. Pammel and Charlotte M. King (*Iowa Sta. Bul. 104, pp. 234–259, figs. 17*).—Notes are given on smut, downy mildew, and spot disease of millet, powdery mildew of wheat, black blight of wheat and oats, and bean anthracnose and rust.

The millet smut, which was noticed in the fall of 1908, is caused by the fungus *Ustilago crameri*. The fungus occurs in the smaller spikelets and completely destroys them, leaving only the outer wall of the ovaries. At times it may become so serious as to destroy the crop almost entirely. Investigations seem to show that the disease is transmitted to the seed, and some studies were carried on to determine the effect of formaldehyde and corrosive sublimate solutions on the germination of spores. The stronger solutions of both fungicides completely prevented the germination of the spores, and it is recommended that seeds should be treated either with formalin or corrosive sublimate before sowing. Investigations have shown that the hot-water treatment is also effective, but it does not appear to have any advantage over the formalin treatment.

The downy mildew of millet (*Sclerospora graminicola*) appears to be widely distributed and occurs not only on the cultivated millet but also on wild foxtail and other host plants. This fungus, from the nature of its growth, does not yield to fungicides, and on this account attempts should be made to plant millet in fields where this plant and foxtail grasses have not been grown.

A spot disease of millet (*Piricularia grisea*) was reported as seriously affecting the crop. This disease is readily recognized by the pale green or yellowish appearance of the leaves and definite purple or reddish colored spots. These spots usually elongate and the center collapses with the progress of the disease. The fungus has long been known as a troublesome parasite, occurring on a considerable number of grasses. No experiments appear to have been made for the treatment of this disease, but some varieties seem less subject to the fungus than others, and it is recommended that more resistant kinds be cultivated.

The powdery mildew of wheat (*Erysiphe graminis*) was unusually prevalent in some of the plats at the station, occurring on certain varieties to an injurious extent. This fungus has been reported in different parts of the country, occurring on a large number of grasses, and its development seems to be due to combinations of heat and moisture. On this account grain should not be too thickly sown. Unacclimated varieties seem particularly susceptible to this trouble, and where the disease is prevalent it is recommended that well-acclimated varieties be selected for sowing. In other investigations (E. S. R., 17, p. 873) it has been suggested that biologic species of *E. graminis* are present. The authors placed a number of species of grasses in contact with leaves of

wheat affected by the powdery mildew, but were unable to infect them with the fungus.

The black blight of wheat and oats (*Cladosporium herbarum*) appeared as a general infection of the fields of the station during 1908. This fungus occurs on many host plants, and the best means for prevention is to keep the fields and neighboring grounds free from weeds upon which it is likely to grow.

In connection with the notes given on the bean anthracnose (*Colletotrichum lindemuthianum*) and the bean rust (*Uromyces appendiculatus*), suggestions are presented for their control.

Report of the department of botany, C. BROOKS (*New Hampshire Sta. Rpts. 1907–8, pp. 330–389, pls. 15, figs. 5*).—This report gives an account of investigations on the fruit spot of apples, apple leaf spot, pine blight, notes on apple and peach diseases, and comparative tests of fungicides.

The report on the fruit spot of apples is a more extended form of a previous account (E. S. R., 20, p. 847).

The report on the leaf spot is by the assistant, I. M. Lewis, and treats of the leaf spot of apples, which in the opinion of the author is primarily caused by the fungus *Sphæropsis malorum*. Experiments with Bordeaux mixture and lime-sulphur mixtures for the control of this disease were carried on, and the sprayed trees retained their leaves long after the unsprayed ones were completely defoliated. The best results were obtained with a 3–3–50 Bordeaux mixture or a lime-sulphur 2–1–50 mixture.

Some investigations were conducted on a pine blight which seems to have occurred chiefly on the white pine. In this the needles were browned in fairly uniform manner over the entire tree or in some cases the tips of the needles were browned while the bases remained green. No evidence of insect or fungus troubles could be found, and it is thought probable that the trouble is of physiological origin, resulting from drought or unfavorable locations.

Descriptions are given of the apple scab, sooty blotch, apple rust, European apple tree canker, winter injury due to extreme cold, spray injury due to Bordeaux mixture, and peach yellows and peach leaf curl. These different diseases are described and remedies suggested where definite means are known.

Comparative tests are reported of a number of fungicides in which the McIntosh apple, a variety especially subject to scab, was sprayed with a number of proprietary forms of Bordeaux mixture, with homemade Bordeaux mixture, with copper phosphate, and with proprietary and homemade lime and sulphur mixtures, the object being to determine their relative value as fungicides and also the injury due to spraying. The Bordeaux mixtures proved the most efficient fungicides, with the proprietary lime-sulphur mixtures a close second. When the possible injury to apples due to Bordeaux mixture is considered, the lime-sulphur solutions seemed to offer an efficient method of controlling scab.

The report concludes with a brief account of spraying experiments noted on page 759.

Annual report of the consulting botanist for 1908, W. CARRUTHERS (*Jour. Roy. Agr. Soc. England, 69 (1908), pp. 308–320, figs. 6*).—An account is given of the work carried on under the supervision of the author, which includes seed investigations and studies of weeds and of diseases and injuries to plants. Among the latter subjects reports are given on the failure of the swede crop due to attacks of *Phoma napo-brassicæ*, the appearance of a Fusarium disease of potatoes, *Botrytis cinerea* on sea kale, and smoke injury to oats.

Report of the section for plant protection, C. BRICK (*Jahrb. Hamburg. Wiss. Anst., 25 (1907), pp. 362–382*).—A report is given of the work carried on in the section for plant protection from July 1, 1907, to June 30, 1908, the work includ-

ing the inspection of imported fruits and plants as well as studies on plant diseases. These latter include a study of the fungi and insects affecting various common crops as well as a number of the tropical crops, the material having been sent to the laboratory for study.

The predisposition of plants to parasitic diseases, H. T. Güssow (*Proc. Assoc. Econ. Biol., 1 (1909), No. 4, pp. 158–170*).—Attention is called to the fact that overassimilation or improper cultivation of plants tends to make them more subject to disease. The author suggests more attention to plant hygiene, and states that if plants are kept under conditions which maintain their healthy growth there will be less predisposition to disease.

The development of farm crops resistant to disease, W. A. Orton (*U. S. Dept. Agr. Yearbook 1908, pp. 453–464, pls. 2*).—After calling attention to the need of varieties of farm crops immune to disease, the author discusses the basis of disease resistance, considering the adaptation to environment, specific resistance to parasites, the nature of the resistance, etc., and describes a number of varieties of cotton, cowpeas, melons, potatoes, clover, wheat, and flax that have been developed by Department and station investigators.

Studies in diseases of cereals and grasses, A. D. Selby and T. F. Manns (*Ohio Sta. Bul. 203, pp. 187–236, pls. 2, figs. 20*).—A description is given of a new anthracnose of certain cereals and grasses, and studies are reported on the fungus of wheat scab, which occurs on seed and as a seedling parasite not only on wheat but also on a number of small grains.

The anthracnose seems to be quite prevalent in Ohio and is believed to be common in neighboring States as well, rye, wheat, oats, emmer, and various grasses being subject to attack. Much of the loss due to the shriveling of grain is attributed to this disease. As a result of a study of affected host plants and the cultivation of the organism, the authors have determined it to be an undescribed species of Colletotrichum, to which the name *C. cereale* n. sp. is given.

The fungus is parasitic on the roots, culms, blades, and spikes of rye, and on the roots, culms, and blades of wheat, oats, barley, emmer, orchard grass, timothy, bluegrass, chess, etc. It is said to have caused noteworthy losses in the yields of rye in fields where it prevails. The attacks of the anthracnose are shown by the premature dying of those portions of the spikes above the point of attack, resulting in an almost total loss of grain in these dead portions. On wheat there is no special attack of the wheat head, and the roots are less frequently affected. The basal portions of the stem and the basal leaf sheaths of wheat are conspicuously attacked, and the disease is accompanied by premature whitening and ripening of the plant and much shriveling of the grain. Similar conditions are found on the other host plants enumerated.

The spores of the fungus readily disseminate the disease through the seed grain, as is shown by the result of centrifuge examinations made of the washings of suspected grain. Seed treatment with formaldehyde is recommended, as preliminary investigations seem to indicate its efficiency.

The studies on the wheat scab have been continued (E. S. R., 11, p. 161), and it is shown that the scab fungus certainly survives as an internal infection in scab-infested kernels of wheat. Pure cultures have been obtained of the fungus by placing externally sterile grains upon agar in Petri dishes. These investigations not only demonstrate that the scab fungus survives in the dead wheat kernels, but also in those capable of germination. The fungus is an exceedingly active parasite, killing young wheat plants when they are a month or less old.

The cause of this disease has been attributed to *Fusarium roseum* and *Gibberella saubinetii*, and infection experiments in the greenhouse and cultural

work carried on with these fungi and material obtained from scabbed wheat, oats, barley, rye, and emmer indicate the identity of the two species.

In addition to the cereals the Fusarium is shown to be an active parasite upon red clover, and there seems to be evidence of its parasitism upon alfalfa, resulting in possible sickness of fields seeded after wheat.

Some studies on Colletotrichum gossypii, R. J. H. DeLoach (*Georgia Sta. Bul. 85, pp. 3–15, figs. 8*).—An account is given of investigations carried on by the author on the cotton anthracnose (*C. gossypii*) while connected with the station. The studies included the life history of the fungus and also some investigations carried on in the fields and in cotton mills.

As a result of his investigations the author found present in the young cotton bolls a mycelium and also a brown mycelium in the seed coats. This mycelium readily grew in cultures, the only difference apparently in the growth of the brown mycelium and that taken from other sources being a difference of time. The brown mycelium seems to be stouter and less sensitive to stimulants.

The author is of the opinion that the control of the disease will depend to a considerable extent on the diseased cotton left in the field, as the mycelium seems to persist throughout the winter. Investigations in the field in 1908 seem to indicate that the disease is carried over either through the brown mycelium in the planted seeds or in the decayed and diseased bolls left over in the field from the previous year.

An attempt was made to determine the effect of selecting seed, and where one lot of seed was planted as it came from the gin and another as selected there was an apparent gain of about 12 per cent in sound plants due to the selection. Marked differences in susceptibility of varieties to the anthracnose are shown, the relative percentage of diseased bolls in 1907 and 1908 being given for 25 varieties.

The relation of the anthracnose to the milling problems was taken up, and it appears that much of the loss incurred in the mills is due to immature or diseased fiber caused by the presence of the fungus.

As practical suggestions for the control of this disease the author recommends the burning of old plants, the rejection of diseased bolls when picking, the gathering of cotton as early as possible, the rotation of crops, and the cleaning of cotton seed, whereby the light seed is rejected, after which the heavy seed is treated with a 3 per cent formalin solution. In addition to these suggestions the use of resistant varieties is recommended as far as they can be secured.

A new disease of potatoes, Ducloux and L. Hédiard (*Betteraves, 19 (1909), No. 487, pp. 299, 300*).—In a communication to the Society of Agriculture of Nord, France, the authors describe a disease of potatoes to which the name curliness is given.

This disease is said to be of a physiological nature and rather poorly defined. A number of causes have been attributed as favoring its development, among them the degeneration of the varieties, soil conditions, and the kind of fertilizers used. The authors appear to think that degeneration of the varieties is the most important of these, and call attention to the facts that the diseased potatoes often show weak, discolored, elongated sprouts, and that in some cases the tubers fail to germinate entirely. In combating the disease it is recommended that tubers from all such plants be rejected and only those tubers planted which have been obtained from regions where the disease is not known and which are sound and show strong, well-developed, and well-colored sprouts.

The prevalence of potato blight in Ireland in 1909 (*Dept. Agr. and Tech. Instr. Ireland Jour., 9 (1909), No. 4, pp. 745–748*).—An account is given of the

outbreaks of potato blight in Ireland up to July 17, 1909, and the action taken by the department to secure a more general use of spraying is briefly stated. This includes the distribution of a large number of leaflets dealing with the prevention of potato blight by means of spraying, and grants and loans for the purchase of spraying apparatus. In the counties covered by the report over 1,000 spraying machines have been distributed to date. A number of overseers and assistants are employed whose duties require them to repair spraying machines, to sell machines at cost price, within certain limits, and to give demonstrations in spraying.

The potato rot (Phytophthora infestans), G. GÁNDARA (*Bol. Soc. Agr. Mexicana, 33 (1909), Nos. 20, pp. 394–396; 21, pp. 412–416; 22, pp. 425–428*).—A description is given of the potato rot due to *P. infestans*, with suggestions for its control, thorough spraying with Bordeaux mixture being recommended.

The use of lime in agriculture, with special reference to its application to finger-and-toe disease in turnips, W. E. COLLINGE (*Jour. Cooper Research Lab., 1909, No. 1, pp. 15–27, figs. 2*).—After discussing the manurial, chemical, and physical effect of lime when applied to the soil, the author takes up its use in connection with certain plant diseases, particularly the club root of cruciferous plants and potato scab.

The application of lime to soils seems to favor the development of potato scab, while if applied at the proper time and in considerable amount it seems to reduce the tendency to the club root disease. Common lime at the rate of 2½ tons per acre, slaked to a fine powder, and thoroughly mixed with the soil, is usually productive of the best results. The application should be made as soon as possible after the removal of a diseased crop and the surface soil should be thoroughly mixed with the lime. Experiments show that the lime may be more effectual on the second than on the first crop which follows its application, and it is thought probable that the greatest effect from its application will not be noted for several years.

Notes on a nematode in wheat, E. C. JOHNSON (*Science, n. scr., 30 (1909), No. 773, p. 576*).—The author reports the appearance in different portions of the United States in 1909 of a nematode in wheat. It was first discovered in grain from California, and its presence has since been reported from Georgia, West Virginia, and New York.

The affected heads of wheat are similar in appearance to those attacked by bunt. The glumes of the spikelets spread somewhat, and the places where the kernels should be are occupied by dark galls full of nematode larvæ. The species is believed to be *Tylenchus tritici*, which has long been known in Europe, but apparently has not been previously reported in America.

The author cites a letter from Dr. E. A. Bessey, who has been for several years making a study of these parasites, in which it is stated that related forms occur on species of Agropyron, Elymus, Calamagrostis, Trisetum, Chætochloa, Agrostis, and Sporobolus in various parts of the United States, but that he had not observed any form attacking wheat. The parasite is said to have gained considerable headway in West Virginia and may prove a serious pest.

It is suggested that infested wheat should be cleaned thoroughly before sowing. It is thought probable that the hot-water treatment used for smut or soaking the seed in a dilute solution of sulphuric acid would destroy the nematodes, but further experiments are necessary before these treatments can be recommended.

The characteristics of apple-tree anthracnose, A. B. CORDLEY (*Better Fruit, 4 (1909), No. 4, pp. 13–17, figs. 6*).—A description is given of the apple-tree anthracnose, previously reported in a publication of the Oregon Station (E. S. R.,

12, p. 58), with suggestions for its control. The means recommended for the prevention of this disease include the cutting out of dead spots and dead wood during the early spring and thorough spraying with Bordeaux mixture during the growing season.

The perfect stage of leaf spot of pear and quince, G. F. ATKINSON (*Science, n. ser., 30 (1909), No. 770, p. 452*).—Attention is called to the fact that the perfect stage of the pear leaf spot fungus (*Entomosporium maculatum*), although probably common, is easily overlooked and seldom reported. It is said to occur quite abundantly on the leaves of the pear and quince affected with the disease which have lain on the ground during the winter.

Some years ago the author discovered the perfect stage of the fungus, which was identified as *Fabræa* sp., but while he has several times grown the Entomosporium from quince fruit in pure cultures, he has never obtained the perfect stage of the fungus in these cultures. He has, however, carried the cultures in the opposite direction and obtained the Entomosporium in pure cultures from ascospores of the Fabræa.

Pending the publication of a full account of his studies, the author thinks it desirable to indicate the name of the fungus in its new position, and that the name of the perfect form should be *F. maculata*.

A new disease of pears, E. MARCHAL (*Bul. Soc. Roy. Bot. Belg., 45 (1908), No. 2, pp. 343, 344*).—The presence of *Phytophthora omnivora* on pears in Belgium is noted. The diseased fruit shows round brown spots, which increase in size until the greater part of the fruit is affected, after which it falls. In one instance the loss due to this fungus was great, fully one-half of the fruit being destroyed. Where pears had been bagged they did not suffer from the fungus. It is thought probable that the disease could be prevented by spraying with Bordeaux mixture.

The American gooseberry mildew and the proposed legislative measures, E. S. SALMON (*Proc. Assoc. Econ. Biol., 1 (1909), No. 4, pp. 150, 151*).—An abstract is given of a paper presented by the author, giving an account of the introduction and spread of the gooseberry mildew (*Sphærotheca mors-uvæ*) in Europe, and reviewing the attempts made to secure legislation looking toward the reduction of the disease in Great Britain.

European currant rust on the white pine in America, P. SPAULDING (*U. S. Dept. Agr., Bur. Plant Indus. Circ. 38, pp. 4*).—Attention is called to the fact that large importations of white pine seedlings have been made for planting in the Northeastern and North-Central States during recent years and that accompanying these seedlings diseased material has been found which upon thorough examination proved to be affected with the white pine blight (*Peridermium strobi*).

This fungus is perennial on the white pine and has for its alternate host species of Ribes. It is known to incubate for at least a year on the white pine before fruiting and the fruiting bodies are situated on the wood formed in the second year.

The fungus is of general distribution in Europe and on this account imported white pine trees should be held under suspicion until proved free of the fungus. The possible damage caused by the distribution of this fungus is very great and precautions are suggested against its importation.

The present status of the chestnut bark disease, H. METCALF and J. F. COLLINS (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 141, pt. 5, pp. 45–54, pl. 1, fig. 1*).—A review is given of the history of the chestnut bark disease and its present distribution is indicated. The disease, which is considered to be due to the fungus *Diaporthe parasitica*, is apparently spreading with considerable

rapidity and is causing the destruction of large numbers of chestnut trees in the infested regions.

Suggestions are given for preventing the further spread of the disease, which include the inspection and destruction of diseased nursery stock and the treatment of diseased trees where this is practicable. In regions where the disease is widespread it is believed doubtful whether individual treatment will pay. Where only isolated cases have appeared it is believed possible to stamp out the disease by carefully cutting out and burning all diseased bark and limbs, thus destroying the sources of infection.

The diseases and parasites of cacao, F. C. VON FABER (*Arb. K. Biol. Anst. Land. u. Forstw., 7 (1909), No. 2, pp. 193–351, pls. 2, figs. 51*).—A monographic study is given of the plant diseases and insect and other pests to which the cacao tree is subject.

A coffee disease in Dominica (*Agr. News [Barbados], 8 (1909), No. 193, p. 292*).—A brief note is given describing the attack of *Stilbella flavida* on coffee berries that were received from Dominica. This fungus has caused serious damage in Mexico and in several South American States and is also reported from Trinidad and Jamaica.

Preventive measures are given which include the removal and destruction of the affected plants, spraying, and careful attention to tillage.

Root diseases of Hevea brasiliensis, W. J. GALLAGHER (*Dept. Agr. Fed. Malay States Bul. 2, pp. 13*).—According to the author, the Para rubber trees in the Malay Peninsula seem to be suffering from root diseases. An investigation led to the identification of the cause, which is said to be due to *Fomes semitostus*. A description of the fungus and the symptoms produced upon the trees is given.

The source of the trouble seems to be in many instances the spread of the fungus from roots and stumps of trees other than rubber. In combating the disease, so far as possible all roots, stumps, and logs should be cleared away, so that there will be no possibility of the mycelium spreading to the newly planted trees.

Another root disease, due to an undetermined fungus, is found occasionally on Para rubber and quite frequently on camphor. The symptoms are quite similar to those produced by the above-described fungus, but the fungus itself behaves in quite a different manner.

A preliminary note on a branch and stem disease of Hevea brasiliensis, W. J. GALLAGHER (*Dept. Agr. Fed. Malay States Bul. 6, pp. 6, fig. 1*).—A branch and stem disease of the Para rubber seems to be quite prevalent, and a study has been made of it with the result that a number of fungi have been found associated with the disease, but the identification of the causal fungus has not been definitely determined.

The disease seems to be found on trees of all ages, and on young trees it first shows itself just above the fork, generally on a branch, but sometimes on the main stem. The first sign is the exudation of a black latex, and as the disease progresses the branches and stems are girdled, the leaves drop, and the branch is quickly killed.

Pending a detailed study of the cause of the disease and means for its control, remedial and preventive measures are suggested which consist of cutting out the diseased branches and coating the wounds with tar or other material. It is thought possible that spraying with Bordeaux mixture, where the attack is limited to a few trees, would prove advantageous.

Parasitic and semiparasitic nematodes occurring on plants, K. MARCINOWSKI (*Arb. K. Biol. Anst. Land u. Forstw., 7 (1909), No. 1, pp. 1–192, pl. 1, figs.*

76).—The results of a study of the parasitic and nonparasitic forms of nematodes are given, special attention being paid to the morphology and biology of the different species. Nine genera are described, of which the parasitic forms are 9 species of Tylenchus and 2 of Heterodera.

An extensive bibliography completes the publication.

Experiments with insecticides and fungicides (*Jour. Cooper Research Lab., 1909, No. 1, pp. 11–14, pls. 2*).—A brief outline is given of experiments being carried on with insecticides and fungicides in which practically all the materials reputed to have fungicidal or insecticidal value are being tested.

Copper as a fungicide, W. H. Barlow (*Jour. Cooper Research Lab., 1909, No. 1, pp. 34–50*).—A summary is given of investigations relating to the use of copper as a fungicide, and the chemistry of Bordeaux mixture and its action on fungi, leaves, and upon the assimilation of the plant are discussed.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

A biological investigation of the Athabaska-Mackenzie region, E. A. Preble (*U. S. Dept. Agr., Bur. Biol. Survey, North American Fauna No. 27, pp. 574, pls. 25, figs. 16*).—This work is based mainly upon two expeditions conducted by the author, the first in 1901, the second in 1903–4. Attention is first given to the itinerary (pp. 11–16); physical geography and climatology of the Mackenzie Basin (pp. 16–49); and life zones of the Athabaska-Mackenzie region (pp. 49–53). The area lies within the Boreal Region and comprises parts of each of its three subdivisions. Previous explorations and collections (pp. 54–85) are then discussed, followed by a general account of the routes traversed by the Biological Survey parties (pp. 85–125).

The mammals are considered at length, all the species known to occur in the region being listed (pp. 126–251). "Owing to the uniformity of climatic and physiographic conditions in the north many species range over large areas without differentiation into races; consequently few new forms have been detected. It has been necessary to describe only one, a northern form of *Evotomys gapperi;* in the case of one or two other forms, old names have been revived."

All the species of birds that have been authoritatively reported from the regions are listed (pp. 251–500). "In the spring, when its rivers and swamps are freed from the grasp of the long Arctic winter, the region becomes the resort of millions of birds which hasten to breed within its borders. These include representatives, and in some cases the bulk of the individuals, of most of the migratory game birds, which are of great economic importance in the United States, where many of them winter."

But few reptiles and batrachians live in the region, only 5 species being recorded (pp. 500–502). Twenty species of fresh-water and anadromous fishes are listed (pp. 502–515) from the Mackenzie Valley. The trees and shrubs of the region are considered at some length (pp. 515–534) and a list of the principal books and articles relating to the birds and mammals of the region is appended.

Regulation for the protection of deer in Alaska (*U. S. Dept. Agr., Bur. Biol. Survey Circ. 68, p. 1*).—Regulations additional to those previously noted (E. S. R., 20, p. 455) are here promulgated.

Fur farming, A. R. Harding (*Columbus, Ohio, 1909, pp. 186, pl. 1, figs. 25*).—A book of information about fur-bearing animals, inclosures, habits, care, etc.

The mammals of Indiana, W. L. Hahn (*Ind. Dept. Geol. and Nat. Resources Ann. Rpt., 33 (1908), pp. 417–654, figs. 41*).—A descriptive catalogue of the mammals occurring in Indiana in recent times.

Use of poisons for destroying noxious mammals, D. E. LANTZ (*U. S. Dept. Agr. Yearbook 1908, pp. 421–432*).—This article describes the various poisons employed in the destruction of noxious mammals and gives directions for their use.

Methods of killing coyotes, J. C. CUNNINGHAM (*Breeder's Gaz., 56 (1909), No. 4, p. 132*).—An account of some California methods of poisoning and trapping coyotes. It is said that on many of the big cattle ranches Australian stag hounds are now used.

How to destroy rats, D. E. LANTZ (*U. S. Dept. Agr., Farmers' Bul. 369, pp. 20, figs. 5*).—This bulletin is, in the main, a digest of Bulletin 33 of the Bureau of Biological Survey of this Department previously noted (E. S. R., 21, p. 346).

Mouse plagues, their control and prevention, S. E. PIPER (*U. S. Dept. Agr. Yearbook 1908, pp. 301–310, pls. 5*).—A brief account of outbreaks in which mice become the source of great loss. A more detailed account of the methods by which they may be controlled has been previously noted (E. S. R., 21, p. 54).

The susceptibility of gophers, field mice, and ground squirrels to plague infection, G. W. MCCOY (*Jour. Infect. Diseases, 6 (1909), No. 3, pp. 283–288*).—In the experiments here reported 3 families of the order Rodentia were represented by the California pocket gopher (*Thomomys bottæ*), field mouse (*Microtus californicus*), and ground squirrel (*Citellus beechyi*), respectively.

"Gophers are highly resistant to plague when inoculated by the cutaneous method, but apparently often susceptible when inoculated subcutaneously. As only 4 animals were used for the subcutaneous inoculation, no sure conclusion can be drawn from the experiments. Field mice are moderately susceptible to cutaneous inoculation and quite susceptible to subcutaneous inoculation. Plague infection was successfully carried directly from animal to animal through three transfers in field mice by the cutaneous method of inoculation. Ground squirrels are highly susceptible to plague infection, no example of immunity having been encountered.

"We may conclude that gophers are not sufficiently susceptible to infection with *Bacillus pestis* to be of any importance from an epidemiological point of view. Field mice are probably about as susceptible as rats, but as they rarely come in close contact with man, it is improbable that they will ever be a serious factor in the spread of plague. As we already know from experience, ground squirrels are of the utmost importance in plague epidemiology."

Campaign against ground squirrels in Contra Costa County, California, R. BLUE (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts., 24 (1909), No. 21, pp. 674–676; Reprint, pp. 5*).—Headquarters were established at Alamo, Cal., about April 20, 1909, and a campaign has been inaugurated which consists of shooting, trapping, and poisoning. For the latter purpose small gas machines will be used for sulphur and carbon bisulphid asphyxiation.

The economic value of predaceous birds and mammals, A. K. FISHER (*U. S. Dept. Agr. Yearbook 1908, pp. 187–194, pls. 3*).—This article discusses the economic value of some of the better known predaceous species. Man's interference is shown to have been an important factor in the undue increase of many pests.

Several aspects of the protection of our native birds, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 20 (1909), No. 5, pp. 369–376*).—A somewhat extended discussion of this subject as applying to the conditions in Australia.

Attention is drawn to the fact that when the natural food of insectivorous birds, etc., is destroyed, or, due to the destruction of their natural enemies, these birds increase in numbers sufficient to exhaust the natural food supply, they may become injurious by preying upon vegetation. The magpie in Australia is cited as an instance of this adaptation to the changed conditions.

The relation between birds and insects, F. E. L. Beal (*U. S. Dept. Agr. Yearbook 1908, pp. 343–350*).—The author considers birds to be the most important natural factor in the control of injurious insects, and he believes that they do but little permanent harm in eating insects indiscriminately.

The importance of local ecological studies to entomology, C. W. Johnson (*Psyche, 16 (1909), No. 1, pp. 5–12*).—This is the presidential address delivered at the annual meeting of the Cambridge Entomological Club, January 19, 1909.

Some phenomena associated with parasitism, F. A. Potts (*Parasitology, 2 (1909), No. 1–2, pp. 42–56, figs. 3*).—"In the Insecta, parasitism appears to influence caste production. Grassi suggested that the sterility of soldiers and workers in Termites is due to protozoan parasites. In ants a giant caste is known (mermithergates) always harboring a nematode worm."

Detection of eggs of parasites in feces, W. Telemann (*Deut. Med. Wchnschr., 34 (1908), No. 35, pp. 1510, 1511*).—The author describes his method for the detection of eggs in feces as follows: (1) Select several small portions, about the size of a pea, from different parts of the stool to be examined; (2) mix them in a reagent glass filled with equal parts ether and hydrochloric acid; (3) shake the mixture; (4) filter through a hair sieve; and (5) centrifugalize the filtrate for 1 minute. The eggs will be found at the distal ends of the centrifugal tubes.

Report of standing committee on insects and diseases, W. T. Horne (*Ann. Rpt. Cuban Nat. Hort. Soc., 3 (1909), pp. 59–67*).—Particular attention is given to citrus troubles, of which the blue-green beetle (*Pachnæus* sp.) is said to be the most serious. During the excessive droughts of the previous 2 years all the groves unless treated with sulfur suffered considerably as the result of the attacks of the red spider. It is said to be necessary to spray all lemon and grape fruit orchards for the rust mite, as well as the orchards of oranges intended for export.

The citrus white fly, which was abundant in the vicinity of the experiment station 4 years ago, can not now be found upon the island. The principal fungus which attacks the guava white fly in Cuba looks like the *Aschersonia aleyrodis* which attacks the white fly in Florida. In previous years the long scale and the oyster-shell scale were extensively destroyed by a gray fungus *Ophionectria coccicola*, while during the summer of 1908 the round black scale was attacked in a very effective manner by *Sphærostilbe coccophila*. The snow scale (*Chionaspis* sp.) is said to be rather exempt from natural enemies.

The orange borer (*Apate carmelita*) was frequently reported as injuring young citrus trees. The scab of lemons, grape fruit, etc., and gummosis or foot rot are also considered, and brief mention made of vegetable and tobacco troubles.

Report of the superintendent of entomology, J. Kotinsky (*Rpt. Bd. Comrs. Agr. and Forestry Hawaii, 5 (1908), pp. 97–119, pl. 1*).—This is the fifth report of the division of entomology, covering the calendar year 1908.

Inspection work is said to have taken up the greater part of the time. Among the pests on fruits condemned were *Aspidiotus rapax* on apples, pears, and lemons, and the purple and San José scales on lemons. Very few lots of turnips were admitted owing to infestation by the cabbage maggot which has not as yet appeared on the islands. Soil on roots, etc., is considered one of the most dangerous importations as a source of agricultural pests. Lists of the pests intercepted in the course of inspection and the beneficial insects distributed are included and the rules and regulations pertaining to the importation and the inspection of honey bees and honey are appended.

[Notes on insect pests] (*Jour. Bd. Agr.* [*London*], *16* (*1909*), *No. 3, pp. 210–212*).—Reports on the occurrence of the pear-leaf blister-mite (*Eriophyes pyri*) indicate that the pest is increasing in frequence in Great Britain. A serious attack of the willow beetle (*Galerucella lineola*) in Somerset ruined many willows for commercial purposes, in some cases the whole crop being destroyed.

[Notes on insect pests] (*Jour. Bd. Agr.* [*London*], *16* (*1909*), *No. 4, pp. 293–297, pls. 2, fig. 1*).—The bulb mite (*Rhizoglyphus echinopus*) was reported as a source of injury by a number of correspondents, particularly the larger growers in Ireland. Vaporite and Apterite lightly powdered over a scale of the bulb were found to kill the moths in a short time. The narcissus fly (*Merodon equestris*) was a great pest of narcissus bulbs 4 or 5 years ago, but is now rarely found due to the practice of destroying all sickly and infested bulbs.

Leaves of the evergreen oak infested by the larvæ of *Lithocolletis messaniella* were received from Guildford with the statement that apparently every evergreen oak in the immediate neighborhood was affected and that some of the younger trees had injuries on every leaf. The Careless variety of the gooseberry is believed to escape generally if not always the attack of the red spider. The occurrence of the asparagus beetle, pear midge, *Otiorhynchus picipes*, *Byturus tomentosus*, *Dilophus febrilis*, *Spathegaster baccarum*, and *Terus terminalis* are also noted.

Insects of the year 1907 [in Scotland], R. S. Macdougall (*Trans. Highland and Agr. Soc. Scot., 5. ser., 20* (*1908*), *pp. 305–308*).—The beech-felted scale (*Cryptococcus fagi*) is said to be widespread over the country and destructive to the beech. The gooseberry and currant saw-fly (*Nematus ribesii*) and the magpie moth (*Abraxas grossulariata*) continue every year to be most troublesome. Methods of combating these pests and the oyster-shell scale, woolly aphis, spruce-gall aphis, larch aphis, and ox warble flies are considered.

Injuries to cultivated plants by insects (*Ber. K. Lehranst. Wein, Obst u. Gartenbau Geisenheim, 1907, pp. 275–305, figs. 8*).—This report consists of a number of short articles on the insects that were injurious in Germany during 1907.

Among the insects considered by G. Lüstner are several scale pests of pomaceous fruits, the injuries by and parasites of *Cochylis ambiguella*, the injuries by bagworms, *Eudemis botrana* and *Julus londinensis*, observations on the occurrence of mites on fruit trees and the grapevine, and injury to apples by *Argyresthia conjugella*. Accounts are given by E. Molz on the cause of color dimorphism in *Rhynchites betuleti*, on the terminal galls of the branches of *Abies nobilis* caused by *Chermes piceæ*, and of the injury to *Ampelopsis quinquefolia* by *Spilosoma lupricipeda*. H. Morstatt reports investigations made of *Diaspis fallax* and of a new pest of the strawberry in Germany.

Some new galls and gall formers from Chile, Kieffer and P. Herbst (*Centbl. Bakt.* [*etc.*], *2. Abt., 23* (*1909*), *No. 1–5, pp. 119–126, figs. 7*).—Galls formed by trypetids, cecidomyids, aphids, coccids, etc., on several species of plants including Hydrangea are here considered. Several genera and species of gall formers are described as new.

The influence of different kinds of fallow on some injurious insects, N. Kurdumov (*Yuzh. Ross. Selsk. Khoz. Ghaz., 1907, No. 35; abs. in Zhur. Opuitn. Agron.* [*Russ. Jour. Expt. Landw.*], *10* (*1909*), *No. 2, pp. 199, 200*).—The author shows that early fallow contributes to the destruction of *Anisoplia austriaca* and that black fallow is similarly destructive for *Agrotis segetum*.

Methods of protecting plants from injurious insects, I. Pachoskiĭ (*Zap. Imp. Obshch. Selsk. Khoz. Yuzh. Ross.*, *78* (*1908*), *Nos. 1–2, pp. 12–25; 3–4,*

pp. 27–42; abs. in Zhur. Opuitn. Agron. [Russ. Jour. Expt. Landw.], 10 (1909), No. 1, pp. 82, 83).—This article is a critical review of the existing measures for combating injurious insects.

Plant pest treatment, H. A. Surface (*Zool. Bul. Penn. Dept. Agr., 7 (1909), No. 1, pp. 31*).—In Section A a list is given of the plants or property liable to injury, with references to Section B in which are given formulas and methods, and to Section C in which directions are given as to the dates and periods of application.

The use of iron arsenate as an insecticide, V. Vermorel and E. Dantony (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 5, pp. 302–304*).—The authors have conducted experiments with iron arsenate and here report upon its value as an insecticide. Considerable success has followed its use during 1906, 1907, and 1908 in combating the codling moth.

It is prepared by slowly adding 400 gm. of iron sulphate dissolved in 10 liters of water to an equal amount of arsenate of soda also dissolved in 10 liters of water. The solution should be constantly agitated as the addition is made. Due to the variation in the purity of these chemicals it is necessary toward the end of the operation to test the mixture with potassium ferrocyanid (or potassium ferricyanid) paper in order to prevent an excess of the iron sulphate. No more of the solution should be added after the paper turns blue and it is also important that there should not be an excess of soluble arsenate.

The stock mixture should be diluted with water to make 100 liters and will contain 200 gm. of ferrous arsenate per hectoliter, also some sulphate of soda and ferrous hydrate. When in contact with the air the ferrous arsenate turns greenish, becoming ferroso-ferric arsenate, and the ferrous hydrate turns to ferric hydrate, which is the best antidote for arsenic poisoning. The general color of the spray material is a dirty green and can not be mistaken for any food product. The maximum adhesive power is reached at the dilution here given.

Iron arsenate and the arsenical salts, V. Vermorel and E. Dantony (*L'Arseniate Ferreux et les Sels Arsénicaux. Montpellier and Villefranche, 1909, pp. 52*).—This work discusses the arsenical insecticides, particular attention being given to iron arsenate, a brief account of which is above noted. On the basis of several years' experiments the authors conclude that the action of iron arsenate, as an insecticide, is equal and sometimes superior to that of lead arsenate. It is easily prepared for use and its adhesive power is greater than that of similar products.

Among the advantages that this insecticide has over lead arsenate are its characteristic color which prevents a mistaken use and the presence of iron in place of lead, the former having a beneficial effect upon the foliage. The most important advantage, however, is the cheapness of the product due to the cheapness of sulphate of iron as compared with acetate of lead.

A new method for making arsenical spray, E. H. Twight (*Better Fruit, 4 (1909), No. 4, pp. 24, 25*).—This is an account of the use of iron arsenate as an insecticide as above noted.

The termites or white ants, K. Escherich (*Die Termiten oder Weissen Ameisen. Leipsic, 1909, pp. XII+198, pl. 1, figs. 51; rev. in Sci. Prog. Twentieth Cent., 4 (1909), No. 13, pp. 171, 172*).—This is a summary of the life history and bionomics of termites.

Locust destruction, A. Kelly (*Natal Agr. Jour., 12 (1909), No. 6, pp. 747–749*).—This is a report of the work for the season of 1908–9 in Natal.

Combating the migratory locusts with chemical products, J. Schroeder (*Ztschr. Pflanzenkrank., 19 (1909), No. 1, pp. 1–13, figs. 4; Bul. Mens. Off.*

Renseig. Agr. [*Paris*], *8 (1909), No. 1, pp. 44–51*).—This is a report of experiments conducted in Uruguay with contact and stomach poisons.

While as high as 82 per cent were killed by contact sprays this method is only applicable to gardens, small fields, and orchards. For more extensive operations sweetened arsenicals must be used. In order to obtain the best results the author considers it necessary to establish a well-organized force in the localities where the locusts are known to breed. It is also deemed desirable that the governments of Uruguay, Paraguay, Argentina, and Brazil cooperate in dealing with the pest.

Contribution to the knowledge of the chemical composition of migratory locusts, their eggs, and young, J. SCHROEDER (*Ztschr. Pflanzenkrank., 19 (1909), No. 1, pp. 13–18*).—The results of analyses here reported show that the migratory locust is much richer in nitrogen and phosphoric acid but poorer in potash than is barnyard manure.

Papers on deciduous fruit insects and insecticides. The pear thrips and its control, D. MOULTON (*U. S. Dept. Agr., Bur. Ent. Bul. 80, pt. 4, pp. 51–66, pls. 3, figs. 5*).—In continuation of investigations previously noted (E. S. R., 19, p. 453), it is announced that the adult thrips cause scab on pears, while the larvæ produce scab on prunes. The adults accomplish their feeding by rasping the tissues and sucking out the plant juices in the early buds and blossoms.

Studies of the seasonal history and habits of the pest are reported. Records kept of the emergence from the soil of adults from 4 orchards in the Santa Clara Valley in 1909 show the first to have been collected on February 15, while by February 25, they were common in all orchards. The maximum emergence begins about February 19 and continues until about March 16. Practically all the thrips were out of the ground by March 20. A lack of food supply causes the adults to migrate, and the fact that migration often takes place before the period of oviposition begins explains why the thrips may injure an orchard during one season and seem to have almost entirely disappeared from it the next. In 1909, oviposition was first observed on March 10. Larvæ hatch out in about 4 days and seek sheltered places between rolled or folded leaves or in blossoms or lie close along the veins on some of the larger leaves. They reach full growth after 2 or 3 weeks, drop to the ground and penetrate into it for several inches where they enclose themselves in a tiny cell and remain during all the rest of the year. While they usually remain in the 3 or 4 in. of harder ground immediately below the surface, where the soil is loose owing to a shallow spring cultivation, they penetrate to a much greater depth and have been found at a depth of from 15 to 16 in. The period of pupation begins in September and reaches its maximum during October, November, and December.

Practical and efficient measures have been perfected for the control of this pest.

"To gain complete control of the pear thrips, both plowing and spraying should be adopted as remedial. Land should be plowed as soon as possible after the early rains in October, November, and December, to a depth of from 7 to 10 in., harrowed or disked, and then cross plowed, the second plowing to be followed also by harrowing. The pupæ are by this means broken from their protecting cells and most of them either injured or killed.

"A combination spray of black-leaf tobacco extract in the proportion of 1 part of extract to 60 parts of water and 2 per cent distillate oil emulsion, or a spray of black-leaf extract alone, should be used against the adults during early March, just when the cluster buds begin to open, and against the larvæ in April, after the blossom petals fall. The thrips must be killed by contact insecticides, and not by internal poisons.

"Fertilizers and irrigation do not kill the thrips in the ground. They act against them only indirectly, by placing the soil in better condition for cultivation and by strengthening the trees."

A contribution to our knowledge of the British Thysanoptera (Terebrantia), with notes on injurious species, R. S. BAGNALL (*Jour. Econ. Biol., 4 (1909), No. 2, pp. 33–41*).—Food plants and localities are recorded for species belonging to the genera Chirothrips, Limothrips, Euthrips, Anaphothrips, Leucothrips, Heliothrips, Parthenothrips, Aptinothrips, Thrips, and Platythrips. *Chirothrips similis* from grass is described as new. *Limothrips cerealium* (=*avenæ*) was taken from *Solanum dulcamara*. *Euthrips pyri* was received from Berkhamsted where it had been taken in plum blossoms.

Notes on our species of Emesidæ, N. BANKS (*Psyche, 16 (1909), No. 3, pp. 43–48, figs. 2*).—Twelve species representing 6 genera of "skeleton-bugs" are reported from the United States of which 7 are described as new to science.

Anatomical and histological studies of the digestive canal of Cimbex americana, H. H. P. and H. C. M. SEVERIN (*Trans. Wis. Acad. Sci., Arts, and Letters, 16 (1908), pt. 1, No. 1, pp. 38–60, pls. 4*).—Studies of the American sawfly.

Habits of the American sawfly (Cimbex americana), with observations on its egg parasite, Trichogramma pretiosa, H. H. P. and H. C. M. SEVERIN (*Trans. Wis. Acad. Sci., Arts, and Letters, 16 (1908), pt. 1, No. 1, pp. 61–76, pl. 1*).—This is a report of biological studies of material obtained from peach-leaved willow (*Salix amygdaloides*) and long-leaved willow (*S. longifolia*) in Milwaukee County, Wis. The sawfly cuts rough gashes through the bark, which extend transversely or nearly so around the branches. The imago first makes its appearance about the beginning of June and disappears toward the middle of July. Five hundred or more eggs may be deposited by the female.

"The total number of eggs deposited on 100 leaves of the peach-leaved willow was 395, of which only 5 eggs were parasitized by *Trichogramma pretiosa*, whereas upon the long-leaved willow there were 280 eggs deposited, and of these, 6 were parasitized by this same Hymenopteron. The percentage of eggs which failed to hatch on account of this egg-parasite was therefore less than 2 per cent.

"The number of pupæ of *T. pretiosa* found in the 5 parasitized eggs was, respectively, 15, 18, 22, 25, and 30."

Aphididæ of southern California, II, E. O. ESSIG (*Pomona Jour. Ent., 1 (1909), No. 2, pp. 47–52, figs. 4*).—In continuation of an article previously noted (E. S. R., 21, p. 451), notes are contributed on the orange aphis (*Aphis citri*) and the walnut aphis (*Callipterus juglandicola*) which is of great economic importance in southern California due to its damage to walnut trees. The appearance of this species on walnut is so sudden and often occurs in such numbers that the damage is done before the orchardist is aware of its presence.

Further studies on the grape phylloxera, B. GRASSI and ANNA FOÀ (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 17 (1908), I, No. 12, pp. 753–760; II, No. 8, pp. 349–359*).—A report of biological studies.

Further studies on the gall form of the grape phylloxera, B. GRASSI and R. GRANDORI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 17 (1908), I, No. 12, pp. 760–770; II, No. 3, pp. 99–106*).—A report of biological investigations.

Results of new investigations in Italy on the biology of phylloxera, particularly the grapevine phylloxera, C. VON JANICKI (*Zool. Zentbl., 15 (1908), No. 12–13, pp. 353–376, figs. 6*). This is an extended review of the investigations of Grassi, Foà, and Grandori, noted above.

Combating the phylloxera in Algeria, R. MARÈS (*Bul. Agr. Algérie et Tunisie, 15 (1909), No. 9, pp. 197–216; Rev. Vit., 31 (1909), Nos. 807, pp. 614–618; 808, pp. 646–649; 809, pp. 668–673*).—This is a report presented at the Agricultural Congress held at Constantine, in which an account of the occurrence of the grape phylloxera in Algeria is given and methods dealing with it are considered. The pest is said to have first been discovered in Algeria at Tlemcen in 1885.

The anatomy of Siphonophora rosarum, the green-fly pest of the rose tree, A. J. GROVE (*Parasitology, 2 (1909), No. 1–2, pp. 1–28, pl. 1, figs. 15*).—A bibliography of 15 titles, relating to the subject, accompanies the account.

Preparations for winter fumigation for the citrus white fly, A. W. MORRILL and W. W. YOTHERS (*U. S. Dept. Agr., Bur. Ent. Circ. 111, pp. 12, figs. 4*).—As a result of investigations conducted by the Bureau of Entomology of this Department during the past 3 years, fumigation for the citrus white fly has been placed upon a practical basis and the process has been so simplified that any citrus grower can undertake the treatment of his grove without depending upon experienced fumigators to conduct the operations.

This circular, which is based upon investigations in 1907 (E. S. R., 20, p. 555), and extensive field experiments since conducted, calls attention to the desirability and, in most cases, the necessity for early preparations, and gives detailed directions for these. The authors recommend fumigation for this pest when groves are isolated by a distance of at least 200 yds. from all other infested groves, in citrus groves or in citrus-growing sections where the white fly has recently appeared and is still of limited distribution, and in sections where cooperation can be secured among growers in naturally isolated groups.

The genus Pseudococcus in California, E. O. ESSIG (*Pomona Jour. Ent., 1 (1909), No. 2, pp. 35–46, figs. 11*).—A provisional key to the females of Pseudococcus in California is given. *Pseudococcus artemisiæ, P. agrifoliæ* from beneath the bark of *Quercus agrifolia* in the locality of Claremont, *P. obscurus* from the roots of Opuntia in the vicinity of Los Angeles, and *Phenacoccus ramonæ* from the roots of the black sage (*Ramona stachyoides*) and from the foliage of *Diplacus glutinosus* are described as new.

Notes on Californian coccidæ, II, E. O. ESSIG (*Pomona Jour. Ent., 1 (1909), No. 2, pp. 31–34, figs. 6*).—In continuation of an article previously noted (E. S. R., 21, p. 452), *Erium lichtensioides* is said to occur in considerable numbers on the stems and twigs of *Artemisia californica*. The long scale (*Coccus longulus*) has spread rapidly and alarmed many citrus growers in the Claremont district. The chaff scale (*Parlatoria pergandii*) has been found in great numbers infesting the trunk, leaves, and fruit of an orange tree in Pomona.

Host index to California coccidæ, E. O. ESSIG and C. F. BAKER (*Pomona Jour. Ent., 1 (1909), No. 2, pp. 53–70*).—Quarantine records are included in this list.

Scale insects and fungi [in the West Indies] (*Agr. News [Barbados], 8 (1909), No. 186, p. 186*).—The red-headed fungus is said to be abundant in Dominica and probably occurs in other islands of the West Indies. This fungus attacks the purple or mussel scale (*Mytilaspis citricola*) principally and the orange snow scale (*Chionaspis citri*) slightly. The green shield scale (*Lecanium viride*), the brown shield scale (*L. hemisphericum*), and similar scales are often attacked by a white fungus which may be detected by the fact that these scales often leave a whitish mark on the leaf or bark when they are removed.

A preliminary account with descriptions of parasites of Diaspis pentagona, F. SILVESTRI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 18 (1909), I, Nos. 10, pp. 489–492; 11, pp. 563–565*).—A lady beetle (*Chilocorus*

kuwanæ) from China and Japan and 2 chalcidoids, *Archenomus orientalis* from Japan and *Prospaltella diaspidicola* from South Africa are described as new.

The possibility and danger of the introduction of the San José scale into Great Britain, W. E. COLLINGE (*Proc. Assoc. Econ. Biol., 1 (1908), No. 4, pp. 171–178*).—The author considers the danger of the introduction of this scale into Great Britain to be very great and rigid measures necessary.

Codling moth investigations, E. D. SANDERSON ET AL. (*New Hampshire Sta. Rpts. 1907–8, pp. 396–498, pls. 5, figs. 23; abs. in Jour. Econ. Ent., 2 (1909), No. 4, pp. 309–311*).—This report is based upon investigations conducted in New Hampshire during the 4 years from 1905 to 1908, a popular account of the first 2 years of which has been previously noted (E. S. R., 19, p. 56).

Studies were made in May, 1907, in a badly infested orchard to determine the position of cocoons on the trees. Out of 385 cocoons found on 7 trees, 70 per cent were on the trunk and the remainder on the main branches. Of those on the trunk 97 were within 1 ft. of the crotch, 112 were within 1 ft. of the ground, and 60 were between on the middle portion of the trunk. In counts of larvæ collected from bands on 9 unsprayed trees the same season, it was found that out of 640 larvæ, 58 per cent were from the lower bands where 1 band was placed just below the crotch and another just above the ground.

Records kept of the condition of the larva in each cocoon and of the apparent cause of mortality showed 94 per cent to have been killed, 87 per cent by birds, 4 per cent by fungi, and 3 per cent by cold. In another badly infested orchard, 1,096 cocoons were examined during the same month. Of these, 66 per cent had been killed by birds, 6 per cent by fungi, and 9 per cent by cold. From these figures it is evident that birds are the most important natural enemies of this pest in New England.

The average date for pupation during 1906, 1907, and 1908 varied from May 25, 1906, to June 16, 1907. The average length of the pupal stage for the 3 years was 20, 16, and 19 days; the majority of the adults appeared June 14, July 2, and June 20, respectively. It was found that the pupal period, while decreasing between May 25 and June 15 from 18 to 15 days, required a total normal temperature (degrees above 32° F.) of 470 to 480°, which is practically a thermal constant. It is concluded that other factors than temperature control the time of pupation and emergence.

While the average length of life of moths which fail to oviposit or deposit but a few eggs, appears to be about 4 days, 6 moths, which laid many eggs and lived under normal conditions, survived from 5 to 28 days, averaging 13 days. From 60 to 75 eggs are laid and often 100 or more. They appear to be deposited promiscuously over the foliage, twigs, and fruit, the majority being placed upon the leaves. A careful study of records for 3 seasons fails to show that the distance of the nearest egg bears any relation to the worminess of the apple. Eggs deposited in June hatched in from 6 to 10 days, while eggs deposited July 2 hatched in 5 days. Since there is a considerable variation in the incubation period at but slightly different temperatures, the author concludes that the eggs are probably deposited at different stages of embryonic development.

Repeated laboratory and field observations have shown that upon hatching out the larvæ first feed upon the foliage, mining into the leaf at the angles of the midrib and branch veins, and gnawing the softer portions of the surface, more often on the under surface. As in breeding cages larvæ matured on foliage alone, the author considers it highly probable that they do so in the orchard. Nine orchards in which the records were kept on unsprayed trees show a variation of from 39 to 77 per cent of the first brood entering the calyx, with an average of 65 per cent, while of the second brood from 22 to 79 per

cent entered the calyx, averaging 46 per cent. The observations recorded indicate that from 25 to 30 days are usually spent in the apple. It is concluded from band records that not over 3 per cent of the larvæ maturing in a season transform to a second brood of moths and probably not over 1 or 2 per cent.

A detailed account is given of spraying experiments conducted in different orchards during 1906, 1907, and 1908. The importance of using large plats and numerous trees in codling moth experiments is emphasized. Experiments based upon individual trees scattered through an orchard are deemed of little worth in determining the value of spraying, due to the influx of moths from surrounding trees. A detailed account of the methods followed in recording and tabulating results is accompanied by orchard diagrams.

Two lbs. of arsenate of lead per barrel was found to be practically the equivalent of $\frac{1}{3}$ lb. of Paris green in effectiveness. Attempts to determine the effect of poisoning the calyx cavity only, in which the arsenical was applied with an atomizer, did not give definite results. Neither were definite results obtained in the attempts to determine the effect of spraying the foliage only, the fruit being protected by bags. On the basis of the large amount of data obtained, the author concludes that the drenching spray has no particular advantage over the mist spray, except as it may deposit more material on the foliage and apples. In the West the calyx cavity is still open 2 weeks after blossoming, by which time the stamen bars have shriveled. This, however, is not the case with the Baldwin apple, as it grows in the East, the calyx closing in a week or at the most 10 days after the blossoms drop, the stamens still remaining turgid, thus preventing the spray from reaching the inner calyx cup.

The records indicate that a second spray applied 1 to 2 weeks after the first is of less value than the third and in many cases is of little value when the first and third are applied. An analysis of the influence of the third spray (applied 3 or 4 weeks after the petals drop) shows that of the total benefit 33 per cent is due to the effect on the second brood, 18 per cent on the calyx wormy, and 19 per cent on the side wormy, first brood. The author concludes that when the foliage and calices are thoroughly sprayed the number killed in the calyx and by feeding on the foliage or surface of the apple will be about equal. The details of the effect of spraying on the amount of worminess of dropped and picked fruit are presented in tabular form and graphically illustrated by text figures.

The antlered maple caterpillar (Heterocampa guttivitta), C. F. Jackson (*New Hampshire Sta. Rpts. 1907–8, pp. 514–531, pls. 9, figs. 3*).—This insect, which has previously been noted as a source of great injury in Maine during 1907 and 1908 (E. S. R., 20, p. 1054), is said to have completely defoliated large tracts of woodlands in New Hampshire during 1908.

The life history and habits are discussed and technical descriptions are given of its stages. *Calosoma calidum* was quite plentiful in different parts of the State, but was outnumbered by *Podisus placidus*, which was observed in infested sections sucking juices from the larvæ. A scarcity of all kinds of birds is thought to be an important factor in the outbreak. Many of the larvæ were found diseased but no large proportion were thus destroyed. At present there appears to have been no way of eliminating this pest from the vast forest areas which have become infested.

A bibliographical list is given and a map showing the distribution of the pest in the State in 1908 is appended.

Cecropia peltata and its relation to Azteca alfari, Atta sexdens and other insects, with a note on the ant thorns of Acacia cavenia, K. Fiebrig (*Biol. Centbl., 29 (1909), Nos. 1, pp. 1–16; 2, pp. 33–55; 3, pp. 65–77, pls. 5; abs. in Nature [London], 81 (1909), No. 2070, p. 23*).—The author has investigated in

Paraguay the relations obtaining between the arboreal species of Azteca and Pseudomyrma and the trees which they inhabit.

It is said that Azteca not only makes use of internodal cavities already existing in the stem of *C. peltata*, but also excavates fresh spaces or enlarges existing ones at the expense of the living tissues of the tree. The presence of colonies of Azteca does not prevent Cecropia from receiving much damage from the attacks of other insect enemies, and the author is of the opinion that the constant loss suffered by the tree from the depredations of Azteca itself involves a more serious drain upon its vitality than the occasional raids of the leaf-cutters. The occupation of Cecropia by these ants not only fails to afford protection against enemies other than the leaf-cutters but also even encourages the assaults of such foes as woodpeckers and internally feeding lepidopterous larvæ. The author concludes that in the species observed by him the benefits of the association between trees and ants are not mutual but are enjoyed by the ants alone.

The food plant of Enarmonia tristrigana, with a description of mature larva, C. A. FROST and J. N. SUMMERS (*Psyche, 16 (1909), No. 1, pp. 13–16*).—Stalks of *Baptisia tinctoria* at South Framingham, Mass., were found to be occupied by one or more of the larvæ of this moth.

Extermination of the maize-stalk borer, J. H. LILIENTHAL (*Natal Agr. Jour., 12 (1909), No. 6, pp. 723–730*).—A brief account of the injury and methods of dealing with the corn-stalk borer. An Ichneumon fly is said to be an important enemy of the pest.

Catalogue of the lepidoptera Phalænæ in the British museum, G. F. HAMPSON (*London, 1908, vol. 7, pp. XV+709+28, figs. 184*).—A key to the genera of the Acronyctinæ is given. Eight hundred and forty-three species are described and their habitat noted.

Manual of North American diptera, S. W. WILLISTON (*New Haven, Conn., 1908, 3. ed., pp. 405, pls. 7, figs. 141; rev. in Science, n. ser., 29 (1909), No. 753, pp. 898, 899*).—In this third revised and enlarged edition, about 1,200 genera are defined which, with the exception of a few doubtful forms, include all those known to occur in North and Central America and the West Indies. More than 600 genera are defined more or less fully and decisively by nearly 1,000 figures.

The appearance of the Hessian fly in 1908 and notes on its life history, M. WOLFF (*Centbl. Bakt. [etc.], 2. Abt., 23 (1909), No. 1–5, pp. 109–119*).—Studies on the biology of *Mayetiola destructor* at Bromberg in Eastern Prussia.

Contribution to the study of trypanosomiasis and to the geographical distribution of some of the blood-sucking insects, etc., J. E. S. OLD (*Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 2, pp. 15–22*).—Observations on the flies and ticks collected by the author during 4 years in Nyasaland, British Central Africa, are here reported.

The striped cucumber beetle, T. J. HEADLEE (*New Hampshire Sta. Rpts. 1907–8, pp. 499–513, pl. 1, figs. 2*).—The author here discusses at length the life history, habits, and methods of combating this insect, which in New Hampshire is single brooded. The literature is freely quoted in connection with the account of the studies conducted.

It was found in New Hampshire that all the pupæ in breeding cages transformed to adults before cold weather. The date at which the beetles appear in the spring seems to vary with the season and latitude from some time in April to early in June. In New Hampshire beetles were found pairing freely on June 24, and copulation continued until about August 30. The first eggs in 1907 were obtained July 2 and the last August 6. In both field and cage experiments eggs were deposited in the surface of the soil, singly or in groups, usually within a crack or crevice anywhere within several inches of the plant. Dissec-

tions of 18 gravid females showed an average of 33 eggs with an upper limit of 59, but 5 pairs confined in breeding cages produced an average of 88 eggs per pair. Thirty-two eggs exposed to an average mean temperature of 74° F. required an average of 7.7 days for hatching.

Under an average mean temperature of 73°, 24 individuals spent an average of 27.1 days in the larval stage. When first hatched the larva is very active and crawls rapidly about. In cages where the soil was moist all the way to the top, the pupal cells were constructed within ½ in., or even less, of the surface, but in others where the surface soil was dry they were constructed in the moist soil even when that was 2½ in. below the surface. Records of 10 individuals showed that an average of 13 days was required to complete the pupal stage under an average mean temperature of 65.9°, while records of 14 individuals showed that an average of 23 days was required under an average mean temperature of 66°. "The length of period from the hatching of the egg to adult, 54.14 days, added to the average length of the egg stage, 7.7 days, gives a total of 61.8 days required to complete the life cycle, under an average mean temperature of 70° F."

Experiments were conducted to determine the effectiveness of various repellents. "Among those with little or no practical value may be mentioned charcoal, soot, road dust, saltpeter, cow manure, chicken manure, burdock infusion, slug shot, hellebore, rags and corn cobs soaked in kerosene, bisulphid of carbon, land plaster, and X. O. dust. Among those that have proven more useful are ashes, air-slaked lime alone or with arsenites, tobacco dust, and Bordeaux mixture alone or with Paris green." Where these were applied the arsenate of lead plats made the best growth of any and the cucumber division thus treated produced the earliest cucumbers in the patch. Three lbs. of arsenate of lead to 50 gal. of water seemed just as effective as 6 lbs.

Although young and tender squash plants were kept dusted the beetles could not be destroyed with either Paris green or arsenate of lead. Squash plants may be used as traps for both squash and cucumber crops provided the latter are covered with some foreign substance to render them distasteful. When a large acreage is to be grown it is recommended that trap squashes be planted about the field a week or ten days before the regular crop is set out and through the field at intervals. Another set of trap squash seed should be planted when the regular crop is put into the ground, and again a week or 10 days before the main crop has been started. From the first appearance of the pest the crop should be thoroughly covered with arsenate of lead at the rate of 3 lbs. to 50 gal. of water or with tobacco dust if preferred. In cases of extreme infestation covering the plants seems to be the only means of saving them. Several kinds of covers are described.

A contribution on the distribution of gall forming beetles in Silesia, H. Schmidt (*Ztschr. Wiss. Insektenbiol., 5 (1909), No. 2, pp. 42–49*).—An annotated list.

Hibernation of the Mexican cotton boll weevil, W. E. Hinds and W. W. Yothers (*U. S. Dept. Agr., Bur. Ent. Bul. 77, pp. 100, pls. 10, figs. 9*).—This is a detailed report of extensive investigations of the hibernation of the cotton boll weevil conducted from 1902 to 1907 in Texas and Louisiana.

The first part of the bulletin (pp. 11–25) discusses the entrance of the weevil into hibernation. Concerning this the authors state that food conditions in the fall govern largely the abundance of the individuals which may enter hibernation and therefore affect the abundance of the species in the following spring, since climatic and shelter conditions govern largely the proportion of the hibernating individuals which may survive. Weevils becoming adult comparatively late in the season are more likely to survive hibernation than are

those which have been active for a number of weeks before the time for them to hibernate successfully. The duration of the entrance period for the species depends upon the severity of the drop in temperature below about 43° F. of mean average temperature. This period usually occurs coincidently with the first killing frosts and extends through a period of about 25 days. Hibernation usually takes place as the mean average temperature falls below 55° and may remain complete until the mean temperature rises above 60°. Temperature conditions were practically normal during November, 1906, and the most favorable time for entrance into hibernation was between November 12 and 15 at Dallas, Tex., and slightly later at the more southern points.

Shelter during hibernation is discussed at some length (pp. 25–33), the following conclusions being drawn: Weevils may avail themselves of almost any kind of shelter and the favorable character of the shelter in relation to the prevailing climatic conditions will influence the percentage of survival. Many pass the winter sheltered by the old bolls that remain hanging upon the stalks. The percentage of survival in bolls decreases generally from southern to northern Texas. Under exceptionally favorable climatic conditions the larvæ which are more than half grown may complete their development if in bolls and become mature during the hibernation period. Immature stages in squares rarely survive.

Hibernation experiments in small cages (pp. 33–38), large cage experiments at Keachie, La., and Dallas, Tex., in 1905–6 (pp. 38–52), emergence in the field at Victoria, Tex., in 1906 (pp. 52–54), large cage experiments at Dallas, Calvert, and Victoria, Tex., during 1906–7 (pp. 55–94), and longevity of weevils after emergence from hibernation (pp. 83–90), etc., are reported accompanied by details in tabular form.

In regard to weevil survival, the authors report exceptionally cold and wet winter weather as most unfavorable for weevil survival. During the winter of 1902–3, at Victoria, Tex., in the small cage experiments, with 356 weevils, an average of about 11 per cent survived. During the following season, also at Victoria, among 400 weevils, ¼ of 1 per cent survived. During the winter of 1904–5, large numbers of weevils were under observation at each of 6 localities ranging from the southern to the northern portions of the infested area. As this was the season of most exceptional rainfall and cold, it was not surprising that no weevil survived in the cage tests except at Victoria, which was the most southern point of experiment. An average for the 6 localities shows a survival of less than two-thirds of 1 per cent. In the small cage work of 1905–6, there was an average survival of 1.3 per cent, and practically all of this occurred in the outdoor cages. In 3 localities under observation during 1906–7, an average of 11.5 per cent of the 75,000 weevils placed in the experiments survived and emerged. The average survival in each of the localities was as follows: Calvert, 9.49 per cent, Dallas, 11.22 per cent, and Victoria, 13.47 per cent. Occasionally weevils may survive in stored cotton seed and be distributed along with it at planting time.

It has been found to be of common occurrence for the weevils to leave their winter quarters upon warm days in spring, returning again to a condition of inactivity for a period of several days or even weeks. The disappearance and reappearance in the case of plainly marked individuals has been observed to occur as many as 8 times and a maximum period of 43 days between appearances has been recorded. In 1907, emergence began during the last week or 10 days of February. At Dallas, 7.8 per cent, at Calvert, 10.5 per cent, and at Victoria, 27.7 per cent of the total numbers of weevils placed in cages were counted as being active at some time during the winter season when they should normally have all been in complete hibernation. Very few weevils emerged

while the temperature was below 57° (1905–6). The sex was determined for more than 8,500 weevils which had survived the winter and it was found that 56.7 per cent of these were males.

In each locality (1907) the maximum longevity after emergence was shown by males, and the average duration of life of that sex was also slightly in excess of that of females. The average survival of all weevils kept without food was about 10 days, but a considerable number lived to between 6 and 12 weeks after emergence. The maximum survival for any unfed weevil was 90 days. It thus appears that there is no chance to starve out all weevils by any possible delay in planting. Among the fed weevils the longest lived was also a male which was active for 130 days after its emergence. The longest lived female was active for 118 days. The average active life for all fed weevils was 25½ days after emergence. Practically one-half of all fed weevils lived for more than 6 weeks in the spring. Reproduction can not begin until the first squares become at least half grown.

It is concluded that at whatever date cotton may be planted in a locality, there is a decided advantage in having it all planted at as nearly a uniform date as is possible. It is considered that this study has demonstrated the enormous practical importance of fall destruction of the plants.

A stem boring beetle attacking cotton in the Sudan, H. H. King (*Jour. Econ. Biol., 4 (1909), No. 2, pp. 42–44, pl. 1*).—A species of the genus Sphenoptera, probably *S. neglecta*, has been found by the author in the province of Berber where it is seriously injuring cotton. Notes are given on the life history and habits of the pest.

"Plants infested by the borers are not usually killed outright, but live to the end of the season, though reduced in vitality. The borers are, however, frequently the indirect cause of the death of the plant, as white ants (termites) which will not, as a rule, attack healthy living plants, readily attack those which have been weakened by the work of the beetle larvæ."

The color sense of the honeybee: Is conspicuousness an advantage to flowers? J. H. Lovell (*Amer. Nat., 43 (1909), No. 510, pp. 338–349*).—The literature is critically reviewed and original observations recorded.

A preliminary contribution to a knowledge of the genus Pepsis, J. Brethes (*An. Mus. Nac. Buenos Aires, 3. ser., 10 (1909), pp. 233–243*).—Numerous species of these pompilids are described as new.

Studies in Oxybelidæ, I, C. F. Baker (*Pomona Jour. Ent., 1 (1909), No. 2, pp. 27–30*).—A provisional table is given for the separation of the four genera of this family. *Belomicrus colorata* and *B. cookii* are described as new.

On new species of Ixodidæ, with a note on abnormalities observed in ticks, C. Warburton and G. H. F. Nuttall (*Parasitology, 2 (1909), Nos. 1–2, pp. 57–76, figs. 26*).—Two species of Ixodes and 9 of Hæmaphysalis, all exotic, are described as new.

The influence of cold on ticks and Piroplasma parvum, A. Theiler (*Bul. Soc. Path. Exot., 1 (1908), No. 8, pp. 451–454; abs. in Jour. Trop. Vet. Sci., 4 (1909), No. 2, pp. 223–225*).—Details are given of experiments conducted with the view of determining the effect of cold upon the causative agent of East coast fever when ingested by *Rhipicephalus appendiculatus*, a brief summary of which has been noted from another source (E. S. R., 21, p. 483).

The effect of cold upon the blue tick is summarized as follows: "Larval ticks of *R. decoloratus* die within 30 minutes when exposed to a temperature of —18° C.; larval ticks of *R. decoloratus* do not die when exposed to a temperature of —18° C. for 15 minutes; larval ticks of *R. decoloratus* do not die when exposed to a temperature of —5° C. for 24 hours; the majority of larval ticks of *R. decoloratus* die when exposed to a temperature of —5° C. for 48 hours."

Insects injurious to clover and alfalfa, J. W. FOLSOM (*Ann. Rpt. Ill. Farmers' Inst., 13 (1908), pp. 101–115, figs. 30*).—A more extended account has been previously noted (E. S. R., 21, p. 453).

Some things that the grower of cereal and forage crops should know about insects, F. M. WEBSTER (*U. S. Dept. Agr. Yearbook 1908, pp. 367–388, pls. 3, figs. 17*).—The author considers the life history and habits of insects and illustrates the importance of such knowledge in combating them. It is shown that destructive insects may often be controlled by methods of farm practice.

Information about spraying for orchard insects, A. L. QUAINTANCE (*U. S. Dept. Agr. Yearbook 1908, pp. 267–288, pls. 5*).—The way in which insects feed, the spraying of dormant trees, and summer spraying are briefly considered. The important insecticides, spraying apparatus and accessories are discussed at some length, accompanied by illustrations.

The insect pests and diseases of the grape, O. VON KIRCHNER (*Die Rebenfeinde, ihre Erkennung und Bekampfung. Stuttgart, 1909, pp. 42, pls. 2, figs. 25*).—This account is accompanied by 2 large colored plates, one illustrating the nature of the injury caused by fungi, and the other the insects and the nature of their injury. A discussion of remedial measures is included.

So-called fruit flies that are not fruit flies, W. W. FROGGATT (*Agr. Gaz. N. S. Wales, 20 (1909), No. 5, pp. 364–369*).—The metallic-green tomato fly (*Lonchæa splendida*) which has caused considerable loss to growers of tomatoes in New South Wales due to their product's being condemned at Melbourne, Victoria, is shown to attack damaged tomatoes only. The other species mentioned are the wine fly (*Drosophila obscura*), the green-bodied fly (*Phaonia personata*) bred from rotting oranges, and the black tomato fly (*Muscina stabulans*).

Papers on deciduous fruit insects and insecticides. Contents and index (*U. S. Dept. Agr., Bur. Ent. Bul. 68, pp. VIII+109–117*).—A table of contents and index to the 9 papers dealing with deciduous fruit insects and insecticides which form Bulletin No. 68 of the Bureau of Entomology of this Department.

Cholera and flies, J. GANON (*Geneesk. Tijdschr. Nederl. Indië, 48 (1908), No. 2, pp. 227–233; abs. in Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 10, p. 158*).—Flies can transmit infection at least 24 hours after a meal of infective matter, and during such a period may be carried very long distances in railway cars. The author was unable to show that the insects could retain the power of infecting for more than 4 days, as none of those he experimented with lived longer than that.

Further investigation on recurrent fever, MANTEUFEL (*Arb. K. Gsndhtsamt., 29 (1908), No. 2, pp. 337–354; abs. in Bul. Inst. Pasteur, 7 (1909), No. 5, pp. 205, 206*).—The author has found that *Ornithodoros moubata* can transmit from rat to rat not only *Spirochæta duttoni* but also *S. obermeieri* from Russia.

Sheep maggot and related flies; their classification, life history, and habits, R. S. MACDOUGALL (*Trans. Highland and Agr. Soc. Scot., 5. ser., 21 (1909), pp. 135–174, figs. 9*).—*Lucilia sericata* is said to be the chief maggot fly of sheep in Great Britain. Very severe direct loss from the death of the maggot-infested sheep is not often reported, however, and such loss is chiefly on hill farms. *Calliphora erythrocephala*, which is typically a carrion feeder, was bred from sheep by the author. Other species here considered are *C. vomitoria*, *Myiospila meditabunda*, *Stomoxys calcitrans*, *Harmatobia stimulans*, *H. irritans*, *Musca domestica*, *M. corvina*, and several Anthomyiid and Sarcophagid flies.

Amœba chironomi n. sp., parasitic in the alimentary tract of the larva of a Chironomus, ANNIE PORTER (*Parasitology, 2 (1909), No. 1–2, pp. 32–41, figs. 21*).—This amœba is said to be distributed through the entire length of the digestive tract of the larva of a Chironomus.

Biggle bee book, J. BIGGLE (*Philadelphia, 1909, pp. 136, pl. 1, figs. 64*).—A pocket guide to practical bee keeping.

Wax craft, T. W. COWAN (*London, 1908, pp. 172, pls. 17, figs. 37*).—A work on beeswax, including its history, production, adulteration, and commercial value.

Annual report of the Bee-Keepers' Association (*Ann. Rpt. Bee-Keepers' Assoc. Ontario, 1907, pp. 80*).—This is a report of the proceedings of the association.

FOODS—HUMAN NUTRITION.

Analyses of eggs, J. T. WILLARD and R. H. SHAW (*Kansas Sta. Bul. 159, pp. 143–177*).—Results are given of analyses of all the eggs laid in 6 weeks by 4 lots of pure-bred chickens.

On an average the thickness of the shells was 0.0139 in., no great variations being observed with the different individuals and different breeds.

"Closely connected with thickness of shell is the factor of weight necessary to perforate the shell, and as would be expected the thinner shells are on the average shown to be perforated by less weights." As might be expected, the individual eggs show some variations.

Data are also recorded regarding the size of the eggs, both the long and short diameters being measured. On an average the eggs weighed 1.88 oz. each, the white constituting 57.01, the yolk 32.75, and the shell 9.99 per cent of the total weight.

As regards composition, little variation was observed in the eggs of the different breeds, namely, American Reds, Plymouth Rocks, Single Comb White Leghorns, and White Wyandottes.

"Perhaps as important a difference as any is shown in the percentage of ether extract in the yolk, running from 31.8 in the Single Comb White Leghorns to 32.87 in the American Reds. The percentages of protein in the yolk show a corresponding variation, ranging from 17.83 with the Leghorns to 17.18 in the American Reds."

In addition to the usual determinations data are reported regarding the percentage of phosphoric acid, the ash in the yolk, and the ratio of phosphoric acid to ash. The average amount of ash was 1.57 per cent and of phosphoric acid 1.43 per cent, the ratio of phosphoric acid to ash being 1 : 1.09.

"It is evident that the ash consists almost entirely of phosphoric acid. This is doubtless produced almost entirely, if not altogether, from the lecithin of the egg yolk."

Horse flesh from the standpoint of food value and hygiene, H. MARTEL (*Hyg. Viande et Lait, 3 (1909), Nos. 1, pp. 21–26; 3, pp. 111–116*).—A summary and discussion of analytical and other data.

Sophistication of meat goods, E. GAUJOUX (*Hyg. Viande et Lait, 3 (1909), Nos. 2, pp. 63–70; 3, pp. 102–111*).—A summary of data on the adulteration of meat goods, methods of detection, and similar topics.

The diastatic enzym of ripening meat, A. W. PETERS and H. A. MATTILL (*Jour. Biol. Chem., 6 (1909), No. 2, pp. XXIX, XXX*).—When muscle is autolyzed the sugar becomes greater provided the meat is fresh and edible, but otherwise, the amount diminishes.

Meat poisoning epidemic caused by Bacillus enteritidis, J. J. HOGAN (*Cal. Bd. Health Mo. Bul., 4 (1908), No. 7, pp. 67–69*).—A severe outbreak of illness was traced to eating beef sandwiches.

According to the author, "the cause of the epidemic was the *Bacillus enteritidis* and not the ordinary bacteria of decomposition.

"This form of meat poisoning occurs when cows . . . suffering with acute intestinal inflammation are killed, and people partaking of [the meat] suffer with the symptoms of acute gastro-enteritis; these symptoms are also present even if the meat is well cooked.

"The ordinary inspection of meat in the dressed carcass would not show any signs of this disease.

"The necessity of careful inspection of cattle before and after slaughtering, as it is only in this way that cases of meat poisoning of this type could be recognized," is pointed out.

The author also believes that "many of the so-called cases of typhoid fever and like intestinal troubles are nothing more or less than types of meat infection as the symptoms produced are identical, and it is only by obtaining a blood culture in these cases that a differential diagnosis can be made."

Contamination of cream cheese with tin from the wrapper (*Pure Products, 5 (1909), No. 10, p. 533*).—A summary of data showing that the surface of cheese may become contaminated with tin. "Before eating cream cheese, the outer layer should be removed, particularly if it appears somewhat grayish in color."

The relative value of condensed and fresh milk (*Dairy World, 18 (1909), No. 210, pp. 108, 109*).—In this discussion of condensed milk for infant feeding analyses by F. J. Lloyd of both machine-skimmed and whole condensed milk are quoted.

Notes on the condensed milk and milk chocolate industry in Switzerland, Mayer (*Pure Products, 5 (1909), No. 10, pp. 522, 523*).—Data are summarized regarding the manufacture of condensed milk and of so-called milk chocolates, which, according to the author, are essentially composed of dried milk and ground cocoa intimately mixed, dried, and pressed.

Composition of rice, potatoes, and manioc, P. Boname (*Sta. Agron. Mauritius Bul. 20, 1909, pp. 41–48*).—Analyses of a number of samples of rice, potatoes, and cassava are reported. The importance of adding a nitrogenous food such as lentils to a ration made up of these carbohydrate foods is pointed out.

Uncured rice as a cause of beri-beri, W. G. Ellis (*Brit. Med. Jour., 1909, No. 2544, p. 935*).—Experiments and institution experience are summarized showing that the eating of uncured rice is a cause of this disease.

In connection with his discussion the author gives the full native diet at the Lunatic Asylum in Singapore, which consists of 1.5 lb. rice, 4 oz. meat, 4 oz. fish, 6 oz. assorted vegetables, 0.5 oz. salt, 0.5 oz. onion, 0.5 oz. lard, and a little garlic daily.

Papers and discussions on beri-beri (*Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 14, pp. 212–218*).—In this account of the proceedings of the Society of Tropical Medicine and Hygiene abstracts of papers by L. Braddon and A. R. Wellington are given as well as of the discussion following the papers.

It seems well established that the occurrence of beri-beri is connected with the use of uncured rice. According to Braddon's conclusion, the disease is attributable to a toxin resulting from a change in the grain. "Either the grain itself becomes altered (as by the formation of poisonous proteins, etc.), or it becomes the seat of growth of agents (e. g., ferments, bacteria, fungi) which produce poisons of their own." When rice is "cured" (E. S. R., 21, p. 466) the toxic change in the grain is prevented.

The production of a vegetable flour rich in sugar as a foodstuff for man and animals, A. Aulard (*Sucr. Indig. et Colon., 74 (1909), No. 7, pp. 172–175*).—The manufacture of a flour by drying and grinding sugar beets is dis-

cussed, the composition of such goods reported, and information given regarding their use for making cakes, puddings, etc., and also as a feeding stuff for farm animals.

On the carbohydrates of shoyu, R. MITSUDA (*Jour. Col. Agr. Imp. Univ. Tokyo, 1 (1909), No. 1, pp. 97–101*).—The presence of glucose and smaller quantities of galactose and maltose in shoyu (soy sauce) was demonstrated as well as free furfurol. According to the author's results, the amount of pentose and pentosan increases for a time and then diminishes.

Physico-chemical studies on tofu, Y. KATO (*Mem. Col. Sci. Engin. Kyōtō, 1 [1909], pp. 325–331; abs. in Chem. Abs., 3 (1909), No. 18, p. 2182*).—The conclusion is reached that tofu (a foodstuff made from soy beans) solution contains a negative colloid.

Food value of mushrooms, F. LESOURD (*Jour. Agr. Prat., n. ser., 18 (1909), No. 35, pp. 301–304*).—A summary and discussion of analytical and other data showing the low nutritive value of mushrooms.

Italian salted tomatoes (*Pure Products, 5 (1909), No. 10, p. 554*).—The manufacture of this product, which is much used in Italy, is described. Tomatoes are allowed to ferment a short time and the strained pulp mixed with salt and evaporated to the consistency of a thick purée.

Judging fruit juices, K. WINDISCH and P. SCHMIDT (*Ztschr. Untersuch. Nahr. u. Genussmtl., 17 (1909), No. 10, pp. 584–645*).—Data on the analysis of fruit juices are summarized and the results of a large number of analyses of different sorts reported and discussed, with special reference to changes in composition due to fermentation and to storage, the influence on composition of preserving fruit juices with alcohol, and the valuation of fruit juices by means of chemical analysis. In addition to the more common fruits and berries, the analyses included mulberry, plum, pear, medlar, quince, and gooseberry juice.

The production of raspberry and cherry juice in Misslitz, Moravia, B. HAAS (*Pure Products, 5 (1909), No. 10, pp. 515–521*).—Methods of extracting and marketing these fruit juices are described.

The composition of the ash of genuine wine and wine treated with gypsum, F. CARPENTIERI (*Staz. Sper. Agr. Ital., 42 (1909), No. 4–6, pp. 273–304*).—Analyses are reported and discussed.

Candied peel, W. J. ALLEN (*Agr. Gaz. N. S. Wales, 20 (1909), No. 7, pp. 595–600, figs. 4*).—Experiments on the manufacture of candied orange and lemon peel were carried out. The selection of the fruit, the grading, the pickling, the manufacture of the sirup, the apparatus, the packing, and the details as to the cost are described.

Analysis and chemical composition of commercial brands of tomato catsups, J. HORTVET (*Pure Products, 5 (1909), No. 10, pp. 529–532*).—Analyses are reported and discussed, with special reference to the use of sodium benzoate as a preservative.

[Sodium benzoate as a preservative], F. W. ROBISON (*Mich. State Dairy and Food Dept. Bul. 167, pp. 32*).—Experiments were made to determine whether sodium benzoate is dissolved and absorbed by the body fluids and whether it has any inhibiting or retarding influence on the digestive agents of the body, and also to ascertain its effects when fed to young animals (cats) for a considerable period in quantities which would be sufficient for preservative purposes.

The results were summarized as follows:

"Sodium benzoate is absorbed, [when taken] in not too large quantities, and enters the system proper of the animal.

"Sodium benzoate in (vitro) doses as low as 0.2 per cent (some instances as low as 0.1 per cent) seems to exert a measurable inhibitory effect on enzymic activity (directly or indirectly).

"Sodium benzoate in ordinary food products does not act as a complete preservative in dilutions below 2 per cent, and in some instances does not preserve even in this strength, although it may show a retarding influence in strengths under this.

"Milk containing as low as 0.1 per cent benzoate of soda seems injurious to the health of young animals, and a fair inference seems to be that it might in a measure at least be injurious to young persons. Larger amounts such as 0.2 per cent and 0.5 per cent [show] correspondingly greater deleterious effects."

The food laws of Switzerland (*Ztschr. Offentl. Chem., 15 (1909), Nos. 8, pp. 141–153; 9, pp. 161–179*).—The pure food laws as recently enacted and put in force on July 1, 1909, are given. Included are the rules, regulations, and definitions for the sale of foods and other commodities.

Report of the committee on food standards of the Association of Official Agricultural Chemists, W. Frear (*1908, pp. 8*).—The recommendations of the committee have to do with manufactured meats (sausage, sausage meat, etc.), malt liquors and spirituous liquors. The other work of the committee is briefly summarized.

Food inspection decisions (*U. S. Dept. Agr., Food Insp. Decisions 108, 109, p. 1 each*).—The importation of coffee and the labeling of wines are the topics discussed.

[Work of dairy and food department], F. W. Robison (*Mich. State Dairy and Food Dept. Buls. 158–160, pp. 67*).—Out of a total of 443 samples of baking powder, buckwheat, butter, catsups, cocoa, canned goods, eggs, extracts, jams, jellies, spices, etc., 134 were found to be adulterated.

Data are also given regarding the inspection work of the department and of a court case dealing with the sale of sausage containing cereal.

Report of Missouri Food and Drug Commission for the month of May, 1909 (*Bul. Dept. Food and Drug Insp. Mo., 1 (1909), No. 2, pp. 23, figs. 3*).—A progress report is made of the work of the state food and drug commission and the report of the analyst, A. H. Douglass, is given regarding the examination of a number of samples of milk, extracts, salad oil, and other materials.

The undesirability of using secondhand bottles for vinegar and for other purposes is discussed.

[Dairy and food division report] (*Penn. Dept. Agr., Mo. Bul. Dairy and Food Div., 7 (1909), No. 7, pp. 119*).—Data are given regarding the analysis of food materials including among others butter, ice cream, lard, milk, nonalcoholic beverages, oleomargarine, and vinegar, as well as the licenses issued and suits and prosecutions instituted under the state pure-food law.

The bulletin also summarizes some general information on clean stores and other topics.

Adulteration of food, W. J. Gerald et al. (*Rpt. Inland Rev. Canada, 1908, pt. 3, pp. 278, figs. 4, dgms. 3*).—This volume contains the reports of the deputy minister, the chief analyst, and the district analysts of Canada, which summarize in brief form data regarding the character and extent of food, drug, and fertilizer inspection work.

In the form of appendixes are reprinted Bulletins 135 to 150, inclusive, of the Inland Revenue Department. Those which have to do with foods, beverages, and domestic water supply have already been noted as they appeared.

Diet and nutrition of the Filipino people, H. Aron (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 3, pp. 195–202*).—Problems of diet in the Tropics are discussed and the results of investigations of Filipino diet reported.

The ration furnished the Filipino prisoners in Bilibid prison in Manila, according to the author's computations, supplies on an average 75 gm. protein, 27 gm. fat, and 510 gm. carbohydrates, with an energy value of 2,647 calories per

man per day. The range in protein content on the different days of the week was from 50 to 96 gm. and in energy from 2,315 to 2,934 calories. The basal ration consists of 270 gm. rice, 45 gm. sugar, 300 gm. bread, about 250 gm. camotes or potatoes, and 50 to 100 gm. onions, which would supply about 45 gm. protein and 2,100 calories. To this is added on the different days of the week fish, bacon, or meat, and sometimes mongo beans also in somewhat varying quantities, together with a little tea, coffee, or ginger root.

As the author points out, the average weight of the Filipino is only from 50 to 55 kg. as compared with an average of 65 kg. for the European, a fact which must be taken into account in comparing the above-mentioned values for the daily diet with commonly accepted standards. The author considers, however, that food requirements are proportional to surface area rather than to weight, and that as Filipinos are on an average probably thinner and taller than Europeans of the same weight, their energy requirement is only about 10 per cent less than that of the European, instead of 20 per cent, which would be the estimate based upon variations in body weight. In general, he concludes that the energy requirements of the body are not lower in the Tropics than in temperate regions as has often been claimed.

To determine whether the diet of the prisoners was in accord with the usual Filipino food habits determinations were made of the nitrogen in the urine of laboratory servants and Filipino students. With the servants "we have never obtained less than 10 gm. of nitrogen in 24 hours, and usually we have found about 12 gm., which corresponds to about 70 to 75 gm. of absorbed protein." In the case of the students the urine "showed a nitrogen content of about 12 to 15 gm., corresponding to from 70 to 100 gm. protein. The results of these examinations warrant the statement that the quantity of protein found on an average in the prisoners' food corresponds to the protein intake of the average Filipino workman.

"Concerning the estimation of the caloric value of the food of the people, we are forced to apply a rougher method. The Filipino is accustomed to take his food together with others from the same dishes and is hence unable to state with accuracy the quantity of food that he individually consumes. We know that the Filipino lives principally on rice and fish, some vegetables and fruits, and very seldom eats meat for the reason that it is not always, for him, obtainable."

According to observations made on house servants, and information obtained from students, the author concludes that the amount eaten per day on an average is from 650 to 700 gm. of rice and about 200 to 250 gm. of fish. Such a ration, disregarding the vegetables and fruit occasionally eaten, according to the author's calculations, would furnish about 70 to 75 gm. protein, 10 gm. of fat, and 525 gm. of carbohydrates per man per day. That the daily food of Filipinos in provinces, and even in towns, does not always contain as much fish is noted.

In discussing the wholesomeness of a diet without fish, the author directs attention to the occurrence of certain diseases such as beri-beri, which are observed where people live exclusively on a diet furnishing a single kind of vegetable protein, and states that in this connection he has made experiments on the effects of a single proteid with rabbits fed corn.

"One other point must not be forgotten. The recent researches on the chemistry of protein bodies on the one hand, and the biological reaction on the other hand, show that the question as to what constituents make up the albuminous substances may be of great importance for their value in nutrition. While it is certain that a man may continue in good health for a long time on a carefully selected purely vegetable diet, nevertheless we see that it is very

often impossible to properly nourish young animals exclusively on one kind of vegetable protein. . . . This has been attributed to a want of certain constituents in vegetable proteins."

Budget of twenty-two workingmen's families in Munich, E. CONRAD (*Einzelschr. Statis. Amt. München, 1909, No. 8, pp. 80; abs. in Hyg. Rundschau, 19 (1909), No. 18, p. 1087*).—Statistics regarding wages, total expenditure for food, expenditure for individual food materials, and similar data are included in this report.

Parsimony in nutrition, J. CRICHTON-BROWNE (*London and New York, 1909, pp. VI+111*).—In this volume the author gives reasons for his belief in a generous rather than a low proteid diet, drawing his evidence from personal experience, considerations of public health, study of the animal functions, undernutrition of school children and of the poor, and the experience of mankind in general.

This volume is an expansion and revison of the author's presidential address to the section of preventive medicine at the meeting of the Royal Institute of Public Health, July, 1908 (E. S. R., 20, p. 769).

Appetite in relation to experimental physiology and clinical pathology, W. STERNBERG (*Zentbl. Physiol., 23 (1909), No. 10, pp. 306–324*).—In this extended summary and discussion of data the author emphasizes the need of considering appetite and lack of appetite in relation to the preparation of food for normal individuals, in invalid dietetics, and related questions.

The influence of sodium chlorid on the digestion and absorption of proteid materials, C. PADERI (*Arch. Farmacol. Sper. e Sci. Aff., 8 (1909), No. 6, pp. 249–261; abs. in Chem. Zentbl., 1909, II, No. 10, p. 843*).—From experiments with animals and in vitro the author concludes that the presence of sodium chlorid facilitates the cleavage of amino acids from peptones. Large quantities of sodium chlorid hinder the process.

The output of organic phosphorus in urine, G. C. MATHISON (*Bio-Chem. Jour., 4 (1909), No. 5–7, pp. 274–279*).—Organic phosphorus compounds, the author concludes, are normally present in urine, contrary statements being due to the employment of incorrect methods of analysis. In young adults, on an ordinary diet, the organic phosphorous was usually found to be more than 0.1 gm. per day. Occasionally it fell below this, while in one case it reached 0.3 gm.

"The percentage of the total P_2O_5 present in organic combination varies considerably from day to day. In the cases examined it averaged 6 per cent of the total.

"The addition of a large quantity of organic phosphorus in the form of glycerophosphoric acid to the diet had no distinct effect on the output of organic P_2O_5, while it increased the total P_2O_5 output. Glycerophosphoric acid was not broken down by gastric or pancreatic digestion in vitro, so it was probably absorbed unchanged.

"In the observations made, vigorous exercise was not followed by increased output of organic P_2O_5.

"The $N:P_2O_5$ ratio was fairly constant in any one individual on a fairly regular diet. It differed greatly in different individuals, and also in the same individual when the diet was irregular."

Effects of chocolate and coffee on uric acid and purins, P. FAUVEL (*Compt. Rend. Acad. Sci. [Paris], 148 (1909), No. 23, pp. 1541–1544*).—With persons on a vegetarian diet chocolate and coffee increased the output of purin bases and diminished uric acid excretion, the diminution being apparently not due to retention in the organism. The excretion of uric acid quickly became constant and remained at the minimum for purins of endogenous origin in the case of the long continued use of chocolate and coffee on a diet otherwise free from purins.

The metabolic balance sheet of the individual tissues. Final report of the committee, F. GOTCH ET AL. (*Rpt. Brit. Assoc. Adv. Sci., 1908, pp. 436–440*).—The principal object of the committee was the establishment of methods for research and it is stated that this end has been attained.

A summary is presened of the work reported during the last 5 years as regards technique and the results obtained in experiments with individual organs.

Further advances in physiology, L. HILL (*London, 1909, pp. VI+440, figs. 50*).—This volume is mainly devoted to the consideration of certain problems concerning circulation and respiration, the neuromuscular system, and vision, and includes the following papers: The Equilibrium of Colloid and Crystalloid in Living Cells, by B. Moore; The Heart, by M. Flack; Pulse Records in Their Relation to the Events of the Human Cardiac Cycle, by T. Lewis; The Vascular System and Blood Pressure, by L. Hill; The Mechanism of Respiration in Man, by A. Keith; The Physiology of Muscular Work, by M. S. Pembrey; Some Chapters on the Physiology of Nerve, by N. H. Alcock; Recent Researches on Cortical Localization and on the Functions of the Cerebrum, by J. S. Bolton; and Studies in Special Sense Physiology, by M. Greenwood, jr.

ANIMAL PRODUCTION.

Experimental zoology. I, Embryogeny, H. PRZIBRAM (*Cambridge, Eng., 1908, pp. VIII+124, pls. 16*).—This is the first of a series of 5 books which are to treat of the fundamental problems of the animal organism. The present volume is a review of recent investigations on the structure of the egg, fertilization, cleavage, and influence of external factors on the development of the egg in its early stages without reference to its origin. The results are summarized as "laws governing the development of the animal egg as ascertained through experiments."

An extensive bibliography is appended.

Elements of the exact study of heredity, W. JOHANNSEN (*Elemente der exakten Erblichkeitslehre. Jena, 1909, pp. VI+516, figs. 31; rev. in Nature [London], 81 (1909), No. 2084, p. 424*).—A translation of a new and enlarged edition of a Danish book first published in 1905, in which are discussed the facts of variation and its statistical study. The author, who is a mutationist, describes his theory of "pure lines" at length. Selection is considered by him to have but little influence in the production of new races. New characters are brought about by crossing and can be propagated in accordance with Mendel's law.

The theory of ancestral contributions in heredity, K. PEARSON (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 547, pp. 219–224*).—This paper was written to show that ancestral influence can not be denied in the case of any population mating at random and inheriting on Mendelian lines. In cases which have been cited by other observers to the contrary attention is confined to isolated lines of inheritance with restricted matings or it is asserted that a gametic knowledge of parents was equivalent to a gametic knowledge of ancestry.

On the ancestral gametic correlations of a Mendelian population mating at random, K. PEARSON (*Proc. Roy. Soc. [London], Ser. B, 81 (1909), No. B 547, pp. 225–229*).—This is an investigation of the correlation of the gametic characters in a general population. The formulæ of different matings are given, which show the effect of individuals of each special type mating with a general population. By obtaining the array of offspring due to any known ancestry the general law of distribution is reached, which demonstrates that

as in the case of somatic characters the correlation between ancestry and offspring decreases in geometric progression, and the regression is linear. Accordingly, there remains not the least antimony between the Mendelian theory and the law of ancestral heredity, if attention is confined to gametic constitution.

"That ancestry does not matter if we know the gametic constitution of the parents, that it does matter if we only know the somatic character of the parents appears to be the solution of one of the difficulties which some have found between the Mendelian and biometric methods of approaching the subject."

Studies of inheritance in rabbits, W. E. CASTLE ET AL. (*Carnegie Inst. Washington Pub. 114, pp. 70, pls. 4, figs. 3*).—This paper reports studies on inheritance of ear size, weight, skeletal dimensions, and color in rabbits.

Reciprocal crosses between lop-eared and short-eared rabbits produced offspring with ears of intermediate length varying about the means of the parental ear length, whether the larger parent was father or mother. A study of the offspring of the primary cross-breds shows that this is a blend of the parental characters and is permanent. The extreme range of variation in ear length among short-eared rabbits was about 10 mm.; in lop-eared rabbits from 20 to 30 mm. The form of the growth curve for ear length from the age of 2 weeks on is convex upward, indicating a steady diminution in the daily growth increment.

Statistics for size inheritance were not very satisfactory, as the size of a growing rabbit varies greatly with the character of the food and other influences. Weight inheritance, skeletal dimensions, and proportions of skeleton parts appeared to behave as blending characters. Volume and weight of bones, however, were uniformly less than mid-parental, a fact that can not be explained without further analysis. Weights of the animals at different ages and weight volume and linear dimensions of bones are presented in tabular form. The linear dimensions in animals, as well as in plants, appeared to blend in their inheritance. Dwarfness is a discontinuous variation, while ordinary variation in height is blending.

The gametic structure of 18 different known combinations of color factors are explained by means of formulæ similar to the structural formulæ used in chemistry. Examples of formulæ for zygotic combinations are also given. Eight color factors are recognized in the gray rabbit, of which 32 combinations are possible. The blue-gray rabbit differs from the gray in the intensity of its pigmentation, which is always dilute, and 16 varieties are possible. Black differs from gray only in the pattern factors and has 16 possible combinations. Blue is a dilution of black with 8 possible varieties. Yellow differs from gray only in the factor which governs the extension of black and brown pigmentation but not of yellow; 16 combinations are possible. Sooty differs from the yellow only in the pattern factor and has 8 possible combinations. The albino differs from the pigmented in the common color factor, which is lacking or is possessed only in a greatly modified form; if absent there are 16 combinations; if present in a modified form 32 combinations are possible.

Mendelian inheritance of sex, A. L. HAGEDOORN (*Arch. Entwickl. Mech. Organ., 28 (1909), No. 1, pp. 1–34, dgms. 3*).—This is a review of investigations on this subject, together with a report of some experiments by the author. In mating brown-red English game bantams with black-red bantams descended from a pure strain, the author failed to produce female black-red homozygotes, but matings of a brown-red male with black-red hens of unknown origin resulted in homozygous females and heterozygous males.

The following are some of the conclusions of the author: Mutation begins with the production of a heterozygote. Inbreeding or self-fertilization is no test for gametic purity. A cross of each individual with another variety is the only method of being positively sure of the homozygous nature of a strain. "When the heterozygote individual, produced by such a mutation, is a female, or a hermaphrodite, and the absence of determinant couples with the determinant for femaleness, the mutation can never show itself during all the normal life of the group. . . . It is possible for a character to be present, and yet unable to manifest itself, because it only acts in modifying a second character, and hence can not assert itself in the absence of this second character. Cuénot's observations are explicable in this way."

The author holds that all inheritance, including sex, is Mendelian. The instances of so-called non-Mendelian inheritance or "blending" are cases where the differences between the 2 forms were unknown. Secondary sex characters need not be predetermined in the germ. The theory of gametic purity does not clash with that of internal secretion.

Selection index numbers and their use in breeding, R. PEARL and F. M. SURFACE (*Amer. Nat., 43 (1909), No. 511, pp. 385–400, figs. 2*).—The authors have devised a method of selecting breeding stock by which a selection of several characters can be made at the same time in an impartial manner.

A selection index number is a single mathematical function which combines several independent or correlative variables and also can be used as an adjunct to the score card for judging all kinds of animals. The formulæ are given which have been used for determining the index number for poultry and corn. The formula for the poultry selection index is as follows: $I_1=\frac{5\ (a+b)}{c+d+1}$. In this, I_1 is the general or fundamental poultry selection index for an individual bird, a the percentage of this bird's eggs which hatched, b the percentage of eggs actually laid by this bird to the total number it was possible for her to lay between February 1 and June 1 (that is, the breeding season) of the year for which the index is calculated, c the percentage of her eggs which were infertile, and d the percentage of chicks hatched from her eggs which died within 3 weeks from the date of hatching.

By the use of this formula an exact and impartial measure is substituted for a rough and cumbersome expression of the relative effect of a number of inherited characters.

Yearbook of scientific and practical animal breeding (*Jahrb. Wiss. u. Prakt. Tierzucht, 4 (1909), pp. CLXVII+188, pls. 8*).—This contains abstracts of important investigations and the following papers: Animal and Plant Breeding, by C. Fruwirth; On the Size of Body and its Relation to the Size and Development of the Lungs and Heart of Two Different Breeds of Sheep, by A. Seeberger (noted on p. 776); The History of Castration in Man and Animals; and Effect of Castration on the Animal Organism, by O. Worch. There are also reports, noted below, on the pasturing of Pinzgauer cattle, by E. Groll, and on pasturing Bayreuth spotted cattle, by M. Miller.

Pasture results for 1908 for the Alpine Societies in Upper Bavaria of the Union for the Pure Breeding of the Pinzgauer cattle, E. GROLL (*Jahrb. Wiss. u. Prakt. Tierzucht, 4 (1909), pp. XXVII–XLIV, pls. 8*).—A report of results in pasturing young cattle in 7 different pastures. Details of measurements for each animal are given. The following table gives a summary of the average gains made in 6 of the pastures after discarding animals which were sick or did not remain at pasture the full time:

Average gains of young cattle at pasture.

GAINS IN 96 DAYS: AVERAGE OF TWO DIFFERENT PASTURES.

Number of animals.	Age of animal.	Increase in height.	Increase in girth.	Increase in length of body.	Gain in weight.	Daily gain in weight.
	Months.	*Cm.*	*Cm.*	*Cm.*	*Kg.*	*Kg.*
1	6	9.0	7.0	.....	41.00	0.427
7	9	6.3	10.0	.....	89.60	.460
7	10–12	5.4	10.9	6.0	51.14	.532
18	13–15	7.0	9.1	6.0	50.50	.494
29	16–18	5.5	10.9	8.6	58.30	.610
10	19–24	5.4	9.3	6.0	58.50	.608
7	24–30	3.8	7.4	7.0	57.00	.595

GAINS IN 116 DAYS: AVERAGE OF TWO DIFFERENT PASTURES.

1	5	7.0	17.0	8.00	95.0	0.818
1	7	8.0	13.0	9.00	15.0	.129
18	10–12	5.7	9.8	11.10	45.2	.463
23	13–15	5.4	11.0	11.75	48.3	.420
17	16–18	4.7	11.3	12.66	63.3	.602
15	19–24	4.5	10.1	12.75	63.3	.545
1	27	3.0	17.0	.....	35.0	.301

GAINS IN 126 DAYS.

4	5–6	8.25	9.5	5.5	37.5	0.297
7	7–9	10.33	10.7	7.1	63.3	.510
10	10–12	7.70	10.0	7.3	52.1	.413
11	13–15	5.80	7.3	7.0	40.7	.322
16	16–18	6.80	6.1	7.9	51.2	.457
7	19–24	8.80	7.8	7.8	50.7	.402
4	25–36	4.25	10.0	8.0	35.0	.277

GAINS IN 131 DAYS.

2	6	7.5	7.5	.....	7.4	0.102
7	7–9	5.5	10.4	.....	9.4	.070
8	10–12	6.4	10.3	.....	17.3	.129
7	13–15	5.5	9.0	.....	46.3	.355
10	16–18	5.5	8.3	.....	37.5	.238
8	19–14	5.0	11.3	.....	52.2	.399
4	25–36	6.2	4.7	.....	62.7	.702

Report on pastures for young stock of the Herdbook Society for Bayreuth Spotted Cattle, M. Miller (*Jahrb. Wiss. u. Prakt. Tierzucht, 4 (1909), pp. LXV–LXXIII*).—A report of gains made in 4 different pastures during 1908. Measurements were made at the beginning and end of the pasture period, which lasted 143 days. The results are presented in tabular form, and the following table is a summary:

Average gains of young cattle in different pastures.

Number of animals.	Age.	Increase in height at withers.	Increase in depth of chest.	Increase in width of chest.	Increase in width of pelvis.	Increase in girth.	Increase in length of body.	Gain in weight.	Daily gain in weight.
	Months.	*Cm.*	*Cm.*	*Cm.*	*Cm.*	*Cm.*	*Cm.*	*Kg.*	*Kg.*
12	12–24	2.5	3.5	2.8	2.5	9.3	5.1	88.1	0.61
6	12–22	3.8	5.0	5.0	4.5	13.0	10.1	99.1	.60
17	16–28	1.8	3.0	2.3	2.2	9.2	4.0	77.6	.54
8	9–18	3.5	3.5	3.0	3.4	13.4	6.0	86.1	.59

Report of work at the Kodiak live stock and breeding station, M. D. SNODGRASS (*Alaska Stas. Rpt. 1908, pp. 58–62, 64*).—This report consists of notes on improvement of the live stock equipment and methods of feeding and caring for the herd of Galloway cattle.

Seventeen head of Galloway cattle, turned into the woods October 31, received less than one-half ration of native hay till February 12, and from then to May 20 they were fed each evening 9 to 14 lbs. of alfalfa, depending upon the weather. The remainder of their feed was obtained by browsing. "The spruce woods furnish excellent shelter for stock and are preferred to the shed by the cattle for the most of the time. Only the cold northeast rains would drive the cattle to the shed. The cattle, thus wintered, did much better than those sheltered at night for the whole winter and fed more liberally."

The most critical time of the year for cattle is May, because the new grass is short and the cattle suffer from cold, wet rains. Grass grows rapidly after June 1. "The summer pasture was good and stock fattened rapidly. The days in summer are long and cattle feed from 18 to 20 hours every day. Young stock make rapid growth and were fat enough for beef by August 1, as were the cows in calf." Cows with calves received a grain ration in the winter months and were allowed to roam in the woods during the day. Native grasses are cured for hay. Beach grass is used for making silage.

"The outlook for successful work with live stock in this region is very bright and deserves attention of every citizen of Alaska, even though he is not directly interested in stock. It should be possible for people to get beef without having to depend upon the boats from the States. There is ample feed for thousands of cattle and sheep on these islands, where there is nothing to-day except a few foxes and bear. It is true that conditions differ from those of the States, but live stock will live here and do well under proper management."

Coyote-proof pasture experiment, 1908, J. T. JARDINE (*U. S. Dept. Agr., Forest Serv. Circ. 160, pp. 40, figs. 5*).—This is a continuation of work previously noted (E. S. R., 20, p. 666), and discusses the durability of the coyote-proof fence and the cost of maintaining it, the attitude of predatory animals toward the fence, the actions of a band of Merino ewes and lambs when at liberty in the inclosure, and the effects of such a grazing system upon the sheep and the carrying capacity of grazing lands.

For the first year the cost of maintaining the 8-mile fence, $20, was expended chiefly for removing trees which had fallen across the fence, and for filling in small holes made by the spring run-offs. All kinds of bears had no difficulty in passing through the fence, 3 lynxes went through or over the fence, and 2 badgers dug under the fence. No conclusions were drawn as to bobcats, but one went in and out over a fallen tree across the fence. The fence has proved to be entirely successful, however, against the coyote, the one great menace to the sheep industry.

The observations on the action of a band of over 2,000 ewes and lambs are summarized as follows: "When entirely protected from destructive animals and unmolested by herders and dogs, a band of ewes and lambs will separate into bunches, come together again, and perhaps again separate while grazing; that they will graze very much more openly and do less trailing than when herded; that they may travel as far, perhaps, as when herded, but because they are scattered and pass over an area only once, the movement is less injurious to the forage crop; that their natural tendency is to bed at night in bunches, but in smaller bunches than when herded; that after they become accustomed to this free system of grazing they are contented to bed wherever night overtakes them, if suitable ground can be found."

At the beginning of the grazing season 20 lambs in a pasture of average size were marked in order to compare their growth with an equal number of lambs belonging to a herded band. After being handled under the pasturage system for 3 months, between the ages of 3 and 6 months, the lambs weighed 8 lbs. more than the best lambs of the same class that had been herded; the loss from the pastured band during the 3 months was 0.5 per cent as against 3 per cent from bands herded on outside range, and the pasturage system gave a heavier and cleaner wool crop.

"It is safe to conclude that range grazed under the pasturage system will carry 50 per cent more sheep than when grazed under the herding system, where the band is driven to and from camp each day. Whether the increase in carrying capacity is greater than 50 per cent will depend chiefly upon the herder, but in part upon the character of the forage crop."

There is a financial statement concerning the economic value of maintaining this pasture, and also a brief report on a successful coyote-proof pasture owned by a private individual.

[Feeding experiments], F. W. TAYLOR (*New Hampshire Sta. Rpts. 1907–8, pp. 322–324 figs. 6.*)—Two lots of 4 yearlings and 4 aged ewes each were used to compare molasses with corn meal as a supplementary ration. The basal ration consisted of middlings, oats, and second crop clover. The experiment lasted 60 days. The lot which received the molasses made a daily gain 1.4 times that fed the cornmeal and the gain was made 1.5 times cheaper for each pound of gain.

In another experiment 15 shoats were divided into 5 lots and fed for 35 days. On soaked shelled corn there was a gain of 82.2 lbs., at a cost of 7.3 cts. per pound; on shelled corn and skim milk a gain of 141 lbs., at a cost of 7.4 cts. per pound; on shelled corn and middlings a gain of 99.3 lbs., at a cost of 8.9 cts. per pound; on shelled corn, middlings, and skim milk a gain of 1.29 lbs., at a cost of 8.2 cts. per pound; and on shelled corn, middlings, and molasses a gain of 104.7 lbs., at a cost of 8.89 cts. per pound.

On the size of the body and its relation to the size and development of the lungs and heart of two breeds of sheep, A. SEEBERGER (*Jahrb. Wiss. u. Prakt. Tierzucht, 4 (1909), pp. LXXIV–CXV*).—Body measurements and weights are given on the Southdown and Franken breeds of sheep.

The Southdowns were larger in all dimensions except depth of chest and height from the ground to the point of the ulna. The average live weight of 75 Southdowns was 47.5 kg., dressed weight 28.8 kg., lung weight 559.5 gm., and heart weight 195 gm. The corresponding averages for 75 Franken sheep were live weight 49.3 kg., dressed weight 24.8 kg., lung weight 645.3 gm., and heart weight 218.4 gm. The author concludes that a thoracic cavity with a large index, that is, a larger breadth, is correlated with a smaller lung.

A bibliography of the literature on the subject is appended.

Dried potatoes and corn for fattening swine, O. KELLNER ET AL. (*Ber. Landw. Reichsamte Innern [Germany], No. 11, pp. 55–88; 12, pp. 227*).—A report of cooperative feeding trials with potato chips, potato flakes, and ground corn at 16 farms and experiment stations. Most of the trials lasted from 80 to 100 days, and nearly 400 animals were used.

In all cases good results were obtained with potato flakes and potato chips, but the corn-fed animals produced a slightly better quality of flesh. The average daily gain per head in 7 experiments lasting about 100 days and involving 210 animals was on the corn ration 0.624 kg., potato flakes 0.63 kg., and potato chips 0.598 kg. In 8 other experiments the corresponding gain with the flakes was 0.665 kg. and with the chips 0.6 kg. As a result of all the experiments it is concluded that the best amount to feed is from 20 kg. to 29 kg. of flakes or

15 kg. to 25 kg. of chips per 1,000 kg. live weight. In most cases larger amounts of flakes can be fed than of the chips. When large quantities of potatoes are fed some other feed containing lime should be added.

The substitution of dried potatoes for oats and corn in rations for horses, O. KELLNER ET AL. (*Ber. Landw. Reichsamte Innern [Germany], No. 11, pp. 1–52*).—In a cooperative experiment at 4 stations, involving 156 horses, a portion of the grain ration of oats and oats and maize was replaced by potato chips and potato flakes combined with either beans, peanut meal, or sunflower seed cake. There was an agreement in all cases to the effect that one-third of the oats could be profitably exchanged for either the chips or flakes combined with a protein feed without a loss of live weight or of ability to work. Analyses of the feeds are given.

Wintering farm horses, H. W. NORTON, Jr. (*Michigan Sta. Bul. 254, pp. 53–59, figs. 3*).—This bulletin reports an experiment on the use for 10 weeks of a variety of cheap substitutes for oats and timothy hay.

Six horses at work received a regular ration of timothy hay and oats at an average cost of 29.6 cts. per day, estimating the feed at current prices. The horses lost on an average 11 lbs. each. Six horses were fed a cheaper ration consisting of shredded cornstalks, oat straw, hay, ear corn, oats, beet pulp, bran, oil cake, and a few carrots, the average cost of which was 17.7 cts. per day, and the horses gained on an average 14 lbs. each. Four horses were also fed the cheaper ration, but as they were at rest part of the time they were not fed so heavily as the other lots. The average cost of maintenance in this trial was 12.9 cts., and the average loss in live weight for each horse 4 lbs.

The Tripoli Barb (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3610, pp. 12, 13*).—Consul W. Coffin at Tripoli city reports that this strain of African horse can be purchased at low prices.

The chief characteristics of this horse are small, well-formed head, arched neck, shoulders olique but strong, high withers, a fairly short back, good quarters, and very clean legs and sound feet. The principal defects are a long, sloping croup, and somewhat too long pasterns. Barbs rarely stand higher than 14.2 hands. The principal colors are gray and bay, with a good proportion of chestnuts, roans, and iron grays. The Turkish cavalry and artillery regiments stationed in the Province of Vilayet are almost entirely horsed with Barbs. The do not possess as much spirit or endurance as the Arab, but some horsemen claim that in appearance they are superior. Their speed is probably fully equal to the Arab's. The prices of Barbs at the present time range from about $23 to $150.

Cost and methods of transporting meat animals, F. ANDREWS (*U. S. Dept. Agr. Yearbook 1908, pp. 227–244, fig. 1*).—This article contains a brief sketch of the history of live stock transportation in the United States, cost and methods of transportation at the present time, and ocean transportation of meat and live stock. At the present time it costs less to transport a given amount of meat than the live animals; hence, there is a tendency to establish new slaughtering centers near the sources of supply.

DAIRY FARMING—DAIRYING.

Sorghum v. corn meal as a source of carbohydrates for dairy cattle, P. N. FLINT (*Georgia Sta. Bul. 86, pp. 19–27*).—In these experiments 10 cows on Bermuda pasture were divided into 2 lots. During the first test 1 lot was fed daily 6 to 7 lbs. each of cotton-seed meal and distillers' grains in the ratio of 5:4, 30 lbs. of green sorghum, and 5 lbs. of oat straw. The other lot was fed 8 to 10 lbs. of equal parts by weight of corn meal, cotton-seed meal, and

distillers' grains, and 5 lbs. of oat straw. At the end of 2 weeks the rations were reversed. On the sorghum ration there was produced 2,747 lbs. of milk, at a cost of $20.83, and on the corn meal ration 2,921.05 lbs. of milk, at a cost of $24.71.

In a second test on a similar grain ration all cows were fed sorghum, but those receiving corn meal were fed one-half as much sorghum as the other lot. On the corn meal ration was produced 2,664.45 lbs. of milk, at a cost of $24.52, and on the ration containing no corn meal 2,576.05 lbs. of milk, at a cost of $21.22. The third test was similar to the first, but the sorghum ration contained a larger proportion of carbohydrates than in the earlier trial. The milk production on the corn meal ration was 2,306.65 lbs., at a cost of $22.93, and on the sorghum ration 2,344.2 lbs., at a cost of $20.23.

"An average of all 3 tests indicates that the corn meal ration produced 3.06 per cent more milk at a 15.86 per cent greater cost. Under the conditions of this experiment corn meal would have to sell for 77.71 cts. per bushel to make it as economical a feed to furnish carbohydrates as green sorghum."

Comparison of corn stover and hay for dairy cows, F. W. Taylor (*New Hampshire Sta. Rpts. 1907–8, pp. 325–327*).—Two cows in 30 days consumed 489 lbs. of grain, 1,125 lbs. of timothy hay, and 1,645 lbs. of silage, and produced 1,622.3 lbs. of milk, testing 3.75 per cent fat. At the same time 2 other cows consumed 489 lbs. of grain, 1,240 lbs. of cut corn stover, and 1,645 lbs. of silage, and produced 1,221.1 lbs. of milk, testing 4 per cent butter fat. In a second period the rations were reversed. Lot 1 consumed 517.5 lbs. of grain, 1,057 lbs. of corn stover, and 1,860 lbs. of silage, and produced 1,345.8 lbs. of milk, testing 3.65 per cent fat. Lot 2 consumed 508 lbs. of grain, 1,222 lbs. of hay, and 1,860 lbs. of silage, and produced 1,269.4 lbs. of milk, testing 3.9 per cent fat. The change from corn stover to hay produced a gain, and the change from hay to corn stover, a loss in flesh.

The relation between form and function of milch cows, J. Schmidt (*Arb. Deut. Gesell. Züchtungsk., 1909, No. 1, pp. 132; abs. in Fühling's Landw. Ztg., 57 (1908), No. 24, pp. 844–846*).—The author measured 371 cows according to Werner's method. His general conclusions are that there is a relation between conformation and milk yield when the dimensions of the different parts of an animal are considered as a whole, but that the dimension of one part of the body alone is not a reliable guide in the choice of a dairy animal, as there are many other factors to be considered.

Mathematical description of the milk producing power of the cow, H. Rodewald (*Fühling's Landw. Ztg., 58 (1909), No. 9, pp. 313–342*).—The author has treated mathematically the data in the article noted above in order to determine quantitatively, as well as qualitatively, the relation between form and function. Milk production was computed as a function of live weight, height, depth of chest, and other dimensions, and the results are presented in graphic form and as mathematical equations.

The calculations indicate that milk production is a function of live weight and can best be represented by the formula: Milk production=17.4—0.01933× live weight. The results obtained by computing milk yields from this equation agree to a large extent with actual observation and with results obtained by computing yields from equations which include a number of body measurements. It is stated that as body weight and linear dimensions are interdependent nothing can be gained by so modifying the equations as to include body measurements.

Conformation and milk yield, C. Kronacher (*Arb. Deut. Gesell. Züchtungsk., 1909, No. 2, pp. 160*).—Body measurements and other determinations were made of 104 cows of the various highland breeds of Germany. The author draws his

deductions by arranging the animals in classes instead of subjecting his data to biometrical analysis, and concludes that there is a correlation between the form of the body and the production of milk, as all milk breeds conform to a certain type, although the "points" of a dairy animal may vary somewhat in different breeds and there are always individual variations. His results are compared with those obtained by other investigators.

A bibliography of the literature on the subject is appended.

The milking trials of 1908, S. R. WHITLEY (*Jour. Brit. Dairy Farmers' Assoc., 23 (1909), pp. 101–144*).—These trials of the British Dairy Farmers' Association were carried out on lines similar to those of previous years. The following table is a summary of the results of the different breeds represented in these trials since 1900:

Average yield and quality of milk of different breeds.

Breed.	Year.	Number of cows.	Daily yield of milk.	Fat.	Total solids.
			Lbs.	*Per cent.*	*Per cent.*
Shorthorns, pedigreed and nonpedigreed	1900–1904	123	48.8	3.72	12.61
Shorthorns, pedigreed	1905–1908	51	47.3	3.47	12.46
Shorthorns, nonpedigreed	1905–1908	70	50.0	3.77	12.65
Lincolnshire Red Shorthorns	1907–1908	16	50.2	3.49	12.35
Jerseys	1900–1904	111	31.3	5.20	14.40
Do	1905–1908	54	34.2	4.89	14.09
Guernseys	1900–1904	36	31.5	4.58	13.65
Do	1905–1908	21	33.8	4.62	13.80
Red Polls	1900–1904	33	40.5	3.70	12.70
Do	1905–1908	41	38.5	3.52	12.50
Ayrshires	1906–1908	12	38.6	3.30	12.15
South Devons	1906	5	48.3	3,72	12.93
Kerries	1900–1904	43	30.9	4.12	13.26
Do	1905–1908	24	35.0	4.09	13.14
Dexters	1906–1908	17	28.9	3.46	12.58

Report of the cow-testing associations in Norway, 1907–8, L. FUNDER (*Aarsber. Offentl. Foranst. Landbr. Fremme, 1908, Statsforanstalt., pp. 559–626*).—The report contains the annual summary of the work of the 146 associations that were in operation during the year, with tables showing the yields of milk and butter fat and the feed consumption for about 35,000 cows. The average yearly production of milk per head was 2,033 kg.

Statistics for Swedish cooperative creameries, 1906, G. LILJHAGEN (*Meddel. K. Landtbr. Styr. [Sweden], 1908, No. 10 (139), pp. 60+VII*).—The statistics include value of buildings and equipment, number of patrons and of cows, average yield of milk per cow, number of hauling routes, method of heating, lighting, and cooling creameries, uses of milk delivered by patrons, running expenses per 1,000 kg. of milk and per kilogram of butter, help employed, payment for milk and net returns, amount of milk per kilogram of butter, price of butter received by creameries, yields of full-cream, part-skim and skim cheese, and other data.

Report of the activities of the dairy institute at Proskau, KLEIN (*Ber. Milchw. Inst. Proskau, 1908–9, pp. 22*).—This is the usual annual report and contains analyses of milk, results of trials of separators, and other related matters.

On the morphology of milk globules, V. NALLI (*Rev. Hyg. et Méd. Infant., 8 (1909), No. 4, pp. 314–325, pls. 2*).—Abnormal forms of globules found in human milk are figured and described. The author recognizes five different kinds of globules and points out their value for diagnosing pathological conditions.

Analyses of colostrum milk, J. Petersen (*Maelkeritid., 22 (1909), No. 28, pp. 615–620*).—The physical and chemical properties of milk from 8 cows were studied for 4 days after calving.

It was found that the red or yellow color disappeared after 20 to 36 hours, and that the specific gravity, behavior on boiling, and percentages of butter fat, solids, and total nitrogen in the milk generally became normal 30 to 40 hours after calving. Owing to the exceptions that are likely to occur, it is recommended that the milk from fresh cows be not mixed with that delivered to creameries until about 72 hours from the time of parturition.

Observations on the influence of heating upon the nutrient value of milk as an exclusive diet for young animals, Janet E. Lane-Claypon (*Jour. Hyg. [Cambridge], 9 (1909), No. 2, pp. 233–238, fig. 1*).—In 2 series of experiments with rats fed raw milk, milk heated to 96° C. and sterilized milk made from full cream dried milk, there was no apparent diminution in nutritive property because of heating.

Partially skimmed milk, A. F. Hess (*Ztschr. Hyg. u. Infectionskrank., 62 (1909), No. 3, pp. 395–400; abs. in Milchw. Zentbl., 5 (1909), No. 7, pp. 325, 326; Chem. Zentbl., 1909, I, No. 20, p. 1665*).—This is a study of the distribution of bacteria in bottled milk and its significance in the feeding of infants.

Counts were made of the bacteria in the different layers of cream. In the upper layer there were found to be much larger numbers of bacteria than in the lower layer and these included tubercle bacilli and streptococci, as well as other kinds which were probably carried there by the fat globules. Centrifugal cream has a smaller bacterial content than cream raised by gravity if the milk passes slowly through the separator running at a high speed. It is suggested that in feeding infants the upper layer of cream be removed before pouring out the milk.

Report to the local government board on the use of preservatives in cream, J. M. Hamill (*Local Govt. Bd. [Gt. Brit.], Food Rpts. 1909, No. 10, pp. 35*).—This contains a discussion and recommendations concerning the use of boron compounds and other preservatives in cream, a report on experiments in the preservation of cream by boron compounds, by A. Harden (noted below), and a report on the detection of small quantities of benzoic acid, salicylic acid, and saccharin in cream, by G. W. Monier-Williams, noted on page 707.

Report on some experiments on the preservation of cream by boron compounds, A. Harden (*Local Govt. Bd. [Gt. Brit.], Food Rpts. 1909, No. 10, pp. 19–32*).—Three series of experiments were carried out in the months of October and November, the following conclusions being drawn:

If the cream be covered, 0.5 per cent of pure boric acid will preserve it for about 6 days at 64 to 68° F., and for about 4 days at 75 to 77°. Uncovered cream containing 0.5 per cent of pure boric acid is liable to become moldy after about 4 days. Two-tenths per cent of pure boric acid will preserve cream for 1 or 2 days only, even at 64 to 68° F. When boric acid was made neutral with caustic soda the production of acid was not checked but the quality of the cream was greatly modified. The presence of saccharin in trade boron preservatives did not add to the efficiency of the preservation.

"Boric acid in presence of about 0.14 equivalent of caustic soda (2.26 cc. of normal caustic soda solution per gram of boric acid (H_3BO_3), or 7 gm. of alkali (Na_2O) per 100 gm. of boric acid) is a more effective preservative than pure boric acid. In the presence of this proportion of alkali 0.4 per cent of boric acid is practically as effective as 0.5 per cent at 65°, but is slightly less effective at 71°. Cream may be preserved by either of these proportions for about 4 to 7 days at temperatures up to 71°."

[Analyses of butter], F. RASMUSSEN (*New Hampshire Sta. Rpts. 1907–8, pp. 534–536*).—Ten samples of butter from as many different creameries were analyzed by the station. The average composition was as follows: Water 11.25, fat 84.38, casein 1.8, and salt 2.57 per cent.

Some essentials in farm butter making, F. RASMUSSEN (*New Hampshire Sta. Circ. 7, pp. 2*).—This circular contains practical hints on cream ripening, churning, salting, working, packing, and marketing butter.

Sterilization of water and milk with ultraviolet rays, P. SANTOLYNE (*Sci. Amer. Sup., 68 (1909), No. 1762, p. 235*).—A summary of investigations on the sterilization of potable water, milk, and wash water used in making butter.

The aeration of milk for cheese making, G. H. BARR (*Rpt. Dairy and Cold Storage Comr. Canada, 1909, pp. 28–43, pls. 2*).—The object of these experiments was to ascertain the effect of aerating and cooling with different methods of handling milk made under ordinary farm conditions. The following table contains a summary of the results:

Summary of the defects in the curds and cheese from milks treated in five different ways.

	Milk aerated by dipping.	Milk run over an aerator.	Milk aerated and cooled.	Milk cooled with water in shotgun can.	Milk cooled in tub of water.
SERIES A.					
Number of curd tests	18	22	18	10	30
Per cent not clean flavor	83.4	68.2	44.0	10.0	6.6
Per cent gassy texture	77.8	68.2	44.0	20.0	6.6
SERIES B.					
Number of curd tests	9	12	10	5	15
Per cent not clean flavor	88.9	50.0	40.0	.....	.....
Per cent gassy texture	77.8	50.0	20.0	.....	.....
SERIES C.					
Per cent of cheese not clean flavor	77.8	75.0	60.0	20.0	13.3

The average temperatures and acidities of the milks when delivered at the factory were as follows: Aerated and cooled, temperature 65.3° F., acidity 0.165 per cent; cooled without aeration, temperature 67.3°, acidity 0.165 per cent; aerated without cooling, temperature 70.9°, acidity 0.169 per cent; and in rusty cans without aerating or cooling, temperature 68.2°, acidity 0.168 per cent. The average loss of butter fat in whey from the different methods of treating the milk at the farms was: When cooled without aeration, cans covered, 0.203 per cent; aerated and cooled, 0.211 per cent; aerated without cooling, 0.219 per cent; and in rusty cans without aerating or cooling, 0.233 per cent.

"The aeration of milk by dipping or by running it over an aerator will not give a uniform quality of milk. The same can be said of aeration and cooling combined. Aeration alone will not keep the milk sweet enough for cheese making purposes during the hot summer months. . . . The milk which was cooled with as little exposure to the air as possible and covered when milking was finished produced the best curds and cheese."

Studies of cheese bacteria which decompose glycerin and casein lactate, GERDA TROILI-PETERSSON (*Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 13–15, pp. 333–342, pl. 1*).—The author found in Swedish farm cheese 3 varieties of aerobic bacteria which decompose glycerin. Three other species were found which produced propionic-acetic acid from casein lactate, and which are closely related

to *Bacterium acidi propionici a* found in Emmental cheese by Freudenreich and Jensen. They were present in larger numbers in old than in young cheese and were specially numerous in cheese containing a large number of holes. One of the varieties under some conditions grows only in the absence of oxygen; in other cases only in the presence of oxygen, and is very variable in form.

On the case of noncoagulating cheese-milk and nonripening bitter curds, A. Wolff (*Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 13–15, pp. 361–373, pls. 3, figs. 4*).—The author describes some species of bacteria, yeast, and fungi found in abnormal milk.

Investigations on the ripening and holing of Swedish farm cheeses, Gerda Troili-Petersson (*Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 13–15, pp. 343–360, pl. 1*).—This is a continuation of earlier work (E. S. R., 15, p. 815).

Normal holing results from inoculation with lactic-acid bacteria, liquefying cocci (*Oïdium lactis*), and *Bacterium glycerini*. In 2 cases holes were formed normally by adding propionic-acid-forming bacteria, lactic-acid bacteria, and liquefying cocci, though when well ripened the characteristic cheese taste was less pronounced than in normal cheese. Saltpeter prevented gas formation with *B. glycerini c* when grown in glycerin agar.

The method of Kuylenstierna was found to be successful for the preservation of several species of cheese bacteria. In pursuing these studies it was found to be of great advantage to sterilize by means of hydrogen peroxid the milk from which the cheeses are made.

Roquefort cheese industry (*Daily Cons. and Trade Rpts. [U. S.], 1909, No. 3610, pp. 8, 9*).—Consul W. H. Hunt, of St. Etienne, reports on this industry, which amounts to 3,797 metric tons of cheese annually. To make this, 92,459 gal. of pure unskimmed sheep's milk is required, which is supplied by about 600,000 sheep. Recent installations of refrigeration plants and other equipment have greatly increased the output over that of former years. In 1908 the United States imported $404,518 worth of the cheese. About 100 liters of milk produce 24 kg. of fresh cheese, whereas imitations of Roquefort made in other localities from cow's milk require 100 liters of milk to make only 15 kg. of cheese. Details of the method of handling the milk and curing the cheese are given.

Studies on fermented milk. II, Kefir, W. Kuntze (*Centbl. Bakt. [etc.], 2. Abt., 24 (1909), No. 5–7, pp. 101–122, pl. 1*).—This is a continuation of earlier work (E. S. R., 20, p. 875) on organisms found in fermented milks, and is chiefly occupied with a discussion of experimental work on the identity of the organisms essential to kefir fermentation.

There were regularly found 2 spore-forming species belonging to the butyric-acid group, one of which proved to be a variety of *Bacillus esterificans*. The other is designated *B. kefir*. According to the author, the characteristic kefir fermentation is due more to these butyric fermentations than to lactic-acid organisms or to yeasts.

A bibliography of the literature is appended.

VETERINARY MEDICINE.

Book of veterinary posology and prescriptions, O. V. Brumley (*Columbus, Ohio, 1909, pp. 190*).—This small handbook has been prepared for the veterinary student as a ready reference in materia medica and pharmacy.

Mallein and tuberculin, S. Villar (*Vet. Jour., 65 (1909), No. 410, pp. 382–394; Vet. Rec., 22 (1909), No. 1103, pp. 147–153*).—A paper presented at the meeting of the National Veterinary Association at Harrogate, England, July 8, 1909.

Tallianin, C. BERNDT (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 26, pp. 481, 482; abs. in Vet. Rec., 22 (1909), No. 1101, p. 118*).—The author considers tallianin to be a valuable remedy in all forms of pneumonia, having lost but 1 out of 70 cases treated by it during the last 3 years. Notwithstanding the high price of the drug he considers that the results obtained amply justify the expense.

Studies on the chemistry of anaphylaxis, H. G. WELLS (*Jour. Infect. Diseases, 6 (1909), No. 4, pp. 506–522*).—"Apparently there are marked differences in the anaphylaxis in animals and there seems to be some differences in the reactions produced by different proteins."

The presence of bacteria in normal organs, H. CONRADI (*München. Med. Wchnschr., 56 (1909), No. 26, pp. 1318–1320; abs. in Vet. Rec., 22 (1909), No. 1102, p. 132*).—Studies of the normal organs of cattle and pigs, in which 162 pieces of tissue were taken from 150 animals, resulted in finding that 72 contained bacteria.

"The liver was by far the most frequently infected organ, 42 out of 63 pieces of liver which were investigated (or two-thirds of the total) containing germs. Bacteria were also found in 18 out of 59 pieces of muscle and in 6 out of 19 kidneys, the proportion of infected organs in each of these cases thus being about one-third. Four out of 5 lungs, 1 out of 4 lymphatic glands, and 1 out of 11 spleens also contained germs.

"*Bacterium coli commune, B. lactis aerogenes, Streptococcus acidi lactici, Bacillus mesentericus, Bacillus fluorescens non liquefaciens, Diplococcus pneumoniæ*, and *Bacillus suipestifer* were all identified culturally in the foregoing order of frequence. The *B. suipestifer* was found on four occasions, namely, deeply situated in the muscles of 2 pigs and 1 bovine, and in the kidney of a pig. Anaerobic bacteria were very often found."

Report of proceedings under the Diseases of Animals Acts for the year 1908 (*Dept. Agr. and Tech. Instr. Ireland, Rpt. Diseases Anim., 1908, pp. 85, charts 2, map 1*).—Of the 11 diseases scheduled under the Diseases of Animals Acts in Ireland but four, anthrax, sheep scab, hog cholera, and parasitic mange, occurred in 1908. There were more outbreaks of the first two than in 1907.

Anthrax in man contracted through the consumption of sausages, F. HUTYRA (*Ztschr. Fleisch u. Milchhyg., 19 (1908), No. 3, pp. 85–94; abs. in Bul. Inst. Pasteur, 7 (1909), No. 6, p. 246*).—Eleven cases of anthrax are reported which resulted from the consumption of sausages manufactured from affected animals.

Infantile kala-azar, C. NICCOLE (*Ann. Inst. Pasteur, 23 (1909), No. 6, pp. 441–471, charts 5*).—This is a disease of the dog which is transmissible to infants. It occurs in Tunis and very probably in southern Italy. A protozoan of the genus Leishmania (*L. infantum*) has been found to be the causative agent. Out of 222 dogs obtained from the pound at Tunis, 4 were found infected.

A bibliography is appended to the account.

Milk sickness, E. O. JORDAN and N. M. HARRIS (*Jour. Infect. Diseases, 6 (1909), No. 4, pp. 401–491, figs. 6*).—In this paper a complete review is given, including the results of the author's investigations, of the disease known as milk sickness, trembles, etc., which is common to man, horses, and cattle (E. S. R., 20, p. 379; 21, p. 383). This affection occurs occasionally at the present time in the States of North and South Carolina, Kentucky, Tennessee, Ohio, Illinois, Indiana, Michigan, and Texas, and in the Territory of New Mexico.

"From practically all cases of the disease that we have seen in man and other animals (horse, sheep, cattle) we have isolated an aerobic spore-bearing bacillus which grows well and characteristically on the ordinary culture media.

We have found this bacillus—named *B. lactimorbi*—in the internal organs and heart blood of animals examined but a few hours after death. In some instances it was present in pure culture (for example, heart blood of a heifer, liver of a fetal calf, gut nodule of a horse, etc.). The same bacillus has been found by us in cow's milk collected by one of us under aseptic conditions and in butter suspected of having communicated the disease. It was also present in the feces in several nonfatal human cases of milk sickness. We have also found it in the soil of milk sick regions. . . .

"Taken as a whole the facts do not surely indicate that a specific microorganism is the cause of milk sickness or trembles. The bacillus in question belongs to a group which seems widely distributed and for the most part certainly not endowed with pathogenic qualities. In particular localities, however, where the soil conditions are favorable in respect to moisture and other unknown factors, strains of the bacillus perhaps possess pathogenic or toxigenic characters; but if so, these, according to our experience, are quickly lost under artificial culture."

A complete bibliography is appended.

Additional notes on the bacteriology and pathology of milk sickness, A. B. LUCKHARDT (*Jour. Infect. Diseases, 6 (1909), No. 4, pp. 492–505, figs. 3*).—This is a report of bacteriological studies conducted in connection with the investigation noted above.

"The preceding experiments are far from being decisive in establishing *Bacillus lactimorbi* as the etiological factor in the production of milk sickness. The organism either loses its pathogenicity very rapidly when grown on artificial media, or the virulence of the organism is dependent on what may be termed a symbiotic life or existence on certain plants. It is possible that its growth on such plants as the rayless golden-rod (Bigelovia), and white snakeroot (*Eupatorium ageratoides*) is responsible for its pathogenic power."

The prevalence of rabies in the United States, J. W. KERR and A. M. STIMSON (*Jour. Amer. Med. Assoc., 53 (1909), No. 13, pp. 989–994, fig. 1*).—"To summarize briefly the results of this inquiry, there were 111 deaths in human beings from hydrophobia reported from 30 States during the year 1908. Rabies was reported in the lower animals from at least 534 localities in 39 States and Territories, including the District of Columbia. Evidence has also been secured of nearly 1,500 persons who, on account of exposure to rabies, or presumably rabid animals, were obliged to take the Pasteur treatment. The disease is disseminated throughout the eastern three-fourths of the country, and seems to have been unknown during the past year only in the Rocky Mountain and Pacific slope regions."

Diagnosis of rabies, V. A. MOORE (*Amer. Vet. Rev., 36 (1909), No. 1, pp. 20–30*).—This paper was presented at the forty-sixth annual meeting of the American Veterinary Medical Association at Chicago, September, 1909. A list of some of the more important works on the subject is appended.

The nature, cause, and prevalence of rabies, J. R. MOHLER (*Amer. Vet. Rev., 36 (1909), No. 1, pp. 31–44*).—A paper presented at the forty-sixth annual meeting of the American Veterinary Medical Association at Chicago, September, 1909.

The development of a piroplasma and trypanosoma of cattle in artificial culture media, E. MARTINI (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 3, pp. 147–169, pls. 6*).—"In the Philippine Islands there are domestic cattle apparently quite healthy which are carriers of the parasite of surra. These cattle are a continual danger, especially for horses, in which surra always runs a fatal course. There exists a variety of Texas fever which is perhaps identical with that seen by Jobling and Woolley in the years 1903 and 1904.

It is a variety of *Piroplasma bigeminum* and shows in certain culture media developmental forms which correspond to those described by Robert Koch in the tick for *P. bigeminum*. This piroplasma, when kept in the bouillon employed and at a temperature of 29 to 31° C., dies within 5 to 10 days.

"In the Philippine Islands there occurs a Trypanosoma of cattle which is different morphologically and biologically from *Trypanosoma evansi* and from the other trypanosomata of mammals. Its virulence for the Indo-Chinese and Australian calves appears to be slight. This trypanosoma could not be discovered in the fresh blood by microscopical examination, but could be cultivated in a mixture of blood and bouillon, and could be transferred to healthy calves by the subcutaneous injection of the cultures. The trypanosoma remains alive and capable of causing infection for at least 10 days in the bouillon employed when kept at a temperature of 29 to 31°. Since the Piroplasma which was present at the same time in the blood of the 'original calf' died out at this temperature within the above-mentioned time, it was possible to isolate the trypanosoma and to transfer it, thus separated from the piroplasma, to calves. These culture experiments prove the great importance of this method for the differentiation of blood parasites."

Notes on a case of Piroplasma bigeminum, A. R. Wellington (*Jour. Trop. Med. and Hyg. [London], 12 (1909), No. 14, p. 207, fig. 1*).—An account of this disease in a bull received in Borneo direct from England.

Equine biliary fever, C. H. H. Jolliffe (*Vet. Jour., 65 (1909), Nos. 409, pp. 338–349; 410, pp. 398–405*).—A review of the knowledge of equine piroplasmosis.

Notes on immunity in canine piroplasmosis, G. H. F. Nuttall and G. S. Graham-Smith (*Parasitology, 2 (1909), No. 3, pp. 215–228*).—As yet the experiments have failed to yield promising results. The parasites of *Piroplasmosis canis* may persist in the blood of apparently recovered dogs for a considerable length of time, 6 months to 2 years, and so long as they are present in the blood the latter remains fully virulent for clean dogs. The passage of the African *P. canis* through upwards of 90 animals in the course of 2½ years has shown that the parasite may be communicated by inoculation from dog to dog for an indefinite period.

Note on attempts to infect the fox and the jackal with Piroplasma canis, G. H. F. Nuttall and G. S. Graham-Smith (*Parasitology, 2 (1909), No. 3, pp. 211–214*).—The experiments appear to indicate that *P. canis* is peculiarly specific in its pathogenicity, since it is incapable of producing disease in the fox and jackal, species closely allied to the dog. They also seem to show that neither of these species is concerned in the maintenance of the disease in nature.

Surra in the Federated Malay States, H. Fraser (*Jour. Trop. Vet. Sci., 4 (1909), No. 3, pp. 345–389, fig. 1*).—Previously noted from another source (E. S. R., 21, p. 682).

Transmission of Trypanosoma brucei by Glossina palpalis, Kleine (*Deut. Med. Wchnschr., 35 (1909), No. 11, pp. 469, 470*).—The author here reports upon investigations conducted in German East Africa.

Flies fed upon infected hosts for 3 days and then for 14 days upon fresh healthy animals did not transmit the infection. From the eighteenth to the twenty-fourth day, however, the flies were fed on a sheep and from the twenty-fifth to the thirty-ninth day on an ox, both hosts becoming infected. Goats, calves, and sheep were used to feed the flies from the fortieth to the fiftieth day and all were infected. "From this it is seen that flies which for many days after the ingestion of blood containing trypanosomes were not infective, afterwards became so."

The author points out that if *G. palpalis* transmits *T. brucei*, there is a possibility that *G. morsitans* transmits *T. gambiense*. He considers that sheep and goats must act in nagana regions as carriers of the parasites.

Anilin antimonyl tartrate in the treatment of trypanosomiases, A. LAVERAN (*Compt. Rend. Acad. Sci. [Paris], 149 (1909), No. 13, pp. 546–548*).—The author reports the immediate results of the treatment of human trypanosomiasis with this drug to be very satisfactory.

Diseases, ticks, and their eradication, A. THEILER (*Transvaal Agr. Jour., 7 (1909), No. 28, pp. 685–699*).—This is a review of the present knowledge of South African tick-borne diseases including the life histories of the ticks concerned and the methods applicable in eradicating them.

Relation of the Indian form of relapsing fever to African tick fever, R. P. STRONG (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 3, pp. 187–193*).—The author's investigations seem to show that the Bombay spirillum fever is distinct from the African tick fever but that it constitutes a form of relapsing fever very closely related to, if not identical with, the forms of relapsing fever encountered in Europe and the United States. From experiments carried on with the different strains of the Spirochetæ, including a study of the morphological characteristics, serum reactions, and animal inoculations, it appears that the European and African strains are distinct species. It does not as yet seem clearly demonstrated that the American and Indian strains are distinct from the European; if not identical, these strains must be very closely related to one another.

East Coast fever (*Agr. Jour. Cape Good Hope, 35 (1909), No. 2, pp. 186–190*).—A résumé of the steps which have been taken by the government for safeguarding Cape Colony against the introduction of East Coast fever from the adjoining colonies of Natal and Transvaal. "The main considerations which have been kept in view are efficient fencing of the borders, adequate patrolling of the fences, and an embargo on the introduction from the infected colonies of animal produce, grass, hay, and other articles which are capable of conveying infection."

The diagnosis of tuberculosis, NEUHAUS (*Deut. Tierärztl. Wchnschr., 17 (1909), No. 20, pp. 285–288; abs. in Vet. Rec., 22 (1909), No. 1101, p. 118*).—The author describes a method which he recommends for the diagnosis of open pulmonary lesions of bovine tuberculosis.

After inserting Dieckerhoff's bleeding canula into the trachea a feather is introduced through the canula which by its contact with the posterior wall of the trachea excites coughing. The sputa projected forward through the trachea adhere to the feather and the material thus obtained is examined for tubercle bacilli. By this method the author proved the existence of open lesions in 11 of 16 cows suspected of tuberculosis.

The practical value of the ocular tuberculin reaction in cattle, FOTH (*Ztschr. Tiermed., 12 (1908), No. 5–6, pp. 321–347*).—The experiments which are here reported indicate that this test is a valuable means for the diagnosis of tuberculosis in bovines.

The ophthalmo-reaction: An exact method of diagnosis, M. KLIMMER and W. KIESSIG (*Monatsh. Prakt. Tierheilk., 20 (1908), No. 3, pp. 97–132; abs. in Rev. Gén. Méd. Vét., 13 (1909), No. 150, p. 331*).—The authors have found the ophthalmo-reaction to be a convenient and accurate method in diagnosing tuberculosis and glanders. Nontuberculous animals do not react even if a concentrated solution of tuberculin be used. A subcutaneous injection of tuberculin preceding has no influence upon the ophthalmic reaction.

Tuberculosis infection in its relation to the tuberculin reaction, S. ARLOING (*Jour. Méd. Vét. et Zootech., 60 (1909), Feb., pp. 65–74; abs. in Vet. Rec., 22*

(1909), No. 1099, p. 89).—The author considers the so-called failures of the tuberculin test, namely, failure to reveal an existing tuberculosis, and an indication of the disease when at the post-mortem examination evidence is lacking.

With rabbits and guinea pigs, in four-fifths of the cases in which inoculation with attenuated bacilli is practiced the resulting lesions are not only microscopic but also atypical. Intraperitoneal inoculation alone of these bacilli in rabbits and guinea pigs produces typical tubercles of millet seed size in the epiploön and the perigastric lymphatic glands.

In young goats and young cattle the subcutaneous injection of attenuated bacilli is followed by a temporary swelling of the corresponding lymphatic glands, but when these glands have regained their normal volume it is generally impossible to find histological lesions in them. When the attenuated bacilli are injected intravenously, histological sections may show some slight lesions. Notwithstanding the absence of macroscopical lesions and the extremely discrete character of the histological alterations, young cattle which have received modified tubercle bacilli always present at a given moment the physiological reaction of tuberculous infection.

These observations demonstrate that there is no necessary relation between the sensibility of the subject to the tuberculin or the sero-agglutination test and the presence of a macroscopic tuberculous lesion. A positive reaction to tuberculin nearly always indicates that the subject has been infected by tubercle bacilli, but does not necessarily indicate the existence of macroscopic lesions, and does not assist in the prognosis of the case. It is impossible to say whether the lesions present in a reacting animal will retrogress or develop into a clinically evident tuberculosis. The owner desiring to stamp out tuberculosis in his herd should, in practice, regard every reactor as infected.

Tuberculosis infection and immunization against tuberculosis by the digestive tract, A. CALMETTE *(Rev. Sci. [Paris], 5. scr., 10 (1908), No. 18, pp. 545–551; abs. in Rev. Vét. [Toulouse], 34 (1909), No. 2, pp. 113–117).*—An account which was presented before the Harvey Society of New York, October, 1908.

Experiments with von Behring's bovovaccine. I, Tests with cattle not protected against natural tuberculosis infection, G. REGNÉR and O. STENSTRÖM *(Meddel. K. Landtbr. Styr. [Sweden], 1908, No. 11 (140), pp. 40+VII; Centbl. Bakt. [etc.], 1. Abt., Orig., 48 (1909), No. 5, pp. 628–657).*—The authors conclude from experiments in 10 different Swedish herds that bovovaccine is an easily applied method of inoculation which is, moreover, entirely harmless, in so far as can be judged after four years' practical experience with it. While it exercises a beneficial effect in certain cases, it can not be recommended as an effective means of combating bovine tuberculosis without accompanying hygienic precautions, like isolation, sterilization of milk fed to calves, etc.

Some facts about tuberculous cattle, E. C. SCHROEDER *(U. S. Dept. Agr. Yearbook 1908, pp. 217–226, pls. 5).*—Data regarding tuberculosis and its transmission are briefly considered. The author concludes that "for the protection of public health it seems imperatively necessary that regulations should be made requiring either that all milk must be obtained from cows certainly free from tuberculosis, stabled, milked, pastured, etc., in an environment free from tuberculous infection, or that it must be sterilized or pasteurized before it is used as a beverage or in the manufacture of butter and other dairy products."

The tuberculosis situation, M. H. REYNOLDS *(Breeder's Gaz., 55 (1909), No. 25, pp. 1402, 1403).*—"I think it fair to say that the Bang method on private farms has not been demonstrated as generally practicable in this country except in the case of very valuable herds. . . . Apparently the one great thing

which we need first and most is some practical system of handling reacting cattle that will be more economical than slaughter with carcass salvage."

Loss among cattle in Alaska, M. D. SNODGRASS (*Alaska Stas. Rpt. 1908, pp. 63, 64*).—Loss among cattle in the vicinity of the Kodiak Station is principally due to their eating wet, dead grass before there is enough green grass to aid digestion. Post-mortem examinations showed the principal seat of impaction to be in the third stomach. The contents of this stomach were so hard, packed, and dry as to crumble in the hands, and the mucous membrane lining the stomach was black and dead. To guard against impaction, cattle should not be allowed to graze on land where there is long dead grass at the time the new grass first appears in the spring, more especially if the period is wet. There is less danger on pastures where the grass has been eaten close the fall previous but the safer way to guard against the trouble is to feed during this period without allowing the cattle to range. Loss was also occasioned by cattle falling over cliffs in early spring. This can be overcome by fencing around the dangerous places or by confining stock during the first weeks of new grass.

Poisoning by cotton-seed meal, RUST (*Veröffentl. Jahres-Vet. Ber. Tierärzte Preuss., 6 (1905), pt. 2, pp. 35, 36 [pub. 1908]; abs. in Vet. Rec., 21 (1909), No. 1080, p. 630*).—The author observed peculiar toxic symptoms in draft oxen that were receiving 2 lbs. of cotton-seed meal per head daily.

Edematous swellings appeared at the extremities, the appetite being undisturbed. In later stages, great weakness of the hind quarters appeared, and in single animals, disturbances of equilibrium. Four out of 15 of the affected oxen showed disturbances of vision. Apparently they became completely blind, as was evidenced by their groping gait and colliding with other animals and surrounding objects. Examination of the eyes revealed no special lesion except marked protrusion of the eye ball and abnormal enlargement of the pupil. The most severely affected animals were slaughtered, but the remainder recovered after the administration of laxatives and alterations in the diet, including the discontinuance of the use of cotton-seed meal.

Johne's disease of cattle, A. S. ALEXANDER (*Breeder's Gaz., 56 (1909), No. 8, pp. 290, 291, fig. 1*).—The author states that he has obtained fairly satisfactory results from the use of fluid extract of eucalyptus, 1 oz., in a pint of cold water every 4 hours. In several cases the scouring absolutely ceased after 5 doses or thereabouts had been given.

Acute dietetic eczema in cows, NISSEN (*Maanedsskr. Dyrlæger, 20 (1909), No. 22, pp. 602–605; abs. in Vet. Rec., 22 (1909), No. 1102, p. 132*).—In the outbreak of dietetic eczema here reported a change of food and symptomatic treatment, lead lotion being used against the eczema and boric lotion against the conjunctivitis, resulted in the complete disappearance of the disease in 2 or 3 weeks.

Investigation of lactosuria in milch cows, SIEG (*Arch. Wiss. u. Prakt. Tierheilk., 35 (1909), No. 1–2, pp. 114–140; abs. in Vet. Rec., 22 (1909), No. 1102, p. 133*).—Lactose, the only sugar that the author was able to find in the urine of milch cows, was present in 38 out of 68 cows studied.

"Lactose is very often found in the urine of cows far advanced in pregnancy, and is probably always to be found at the time of parturition. The lactosuria is physiological, appearing from overproduction of milk sugar in the mammary glands during parturition. Usually the lactosuria diminishes gradually until it completely disappears, but in some cows the urine yields lactose during the whole period of milking."

Relapses in milk fever, C. STEFFEN (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 14, pp. 265, 266; abs. in Vet. Rec., 22 (1909), No. 1106, p. 182*).—Two cases

are reported in which recovery from milk fever was speedily followed by severe relapse. The relapse in the first case is supposed to have been due to milking too soon after the previous recovery, while overfeeding is suggested as the cause of the second. In both cases the relapse assumed a more serious form than the initial attack, but both were cured by the insufflation of the udder with air. It is the author's practice to administer a purgative when tympany appears as a complication of milk fever.

Hepatic echinococcosis as a cause of chronic tympany in cattle, E. Weber (*Deut. Tierärztl. Wchnschr., 17 (1909), No. 24, pp. 347–349; abs. in Vet. Rec., 22 (1909), No. 1104, p. 157*).—Two cases are described in which hepatic echinococcosis was the cause of chronic tympany.

Infectious keratitis of calves, K. Vas (*Állatorvosi Lapok, 31 (1908), No. 44, pp. 537–539; abs. in Vet. Rec., 21 (1909), No. 1083, p. 695*).—The author describes an epizootic outbreak of infectious keratitis in calves which does not appear to be transmissible to other animals.

Normal salt solution in diarrhea of calves, Kronacher (*Berlin. Tierärztl. Wchnschr., 25 (1909), No. 31, pp. 575, 576; abs. in Vet. Rec., 22 (1909), No. 1101, p. 118*).—A 2-weeks-old calf which had suffered for 2 day from violent diarrhea and presented symptoms of cardiac failure, rapidly recovered when treated with physiological salt solution. Two enemata, each of 3½ pt., were given within 6 hours.

A new prophylactic treatment for dysentery in calves, K. Evers (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 4 (1908), No. 5–6, pp. 463–468, fig. 1*).—The author has employed the different sera and also treated the umbilicus against the dysentery of calves for a long time without completely satisfactory results and considers that too much has been claimed for these methods. A new method of prophylaxis is here described which was practiced extensively in the winter of 1907–8 with very successful results.

The method consists in moving the calves as soon after birth as possible to a box which is easy to cleanse and keeping them there for 4 or 5 days. During this time it is necessary that the calves be fed with the mother's milk and that the person who feeds them should have clean hands. Special movable boxes for this purpose are described.

Gastro-intestinal strongylosis of sheep, L. Caze (*Rev. Gén. Méd. Vét., 12 (1908), No. 144, pp. 688–690; abs. in Vet. Rec., 21 (1909), No. 1086, p. 745*).—This affection committed great ravages in Algeria during the summer of 1908. It is caused by *Hæmonchus* (*Strongylus*) *contortus* which lives in the abomasum and by *Nematodirus* (*Strongylus*) *filicollis*, a parasite of the small intestine. The disease is particularly intense toward the end of summer and during the autumn and the mortality very high. A pure water supply is important from a prophylactic point of view. Isolation of affected animals and burning the viscera of infected cadavers are recommended.

As a curative treatment the author employs a mixture of oil of cade, oil of turpentine, and alcohol (90 per cent), 50:50:15, which is administered in the morning. In this way the author has been able to save 70 or 80 per cent of the animals when the treatment was commenced in the early stages of the disease.

The rôle of distomes in hydremia of sheep, H. Carré (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 6, pp. 262, 263*).—The author's experiments show that neither the absorption of blood nor the excretion of toxins by distomes are the immediate cause of hydremia in sheep.

Investigations of the specific antibodies in distomiasis and cysticercosis, Weinberg (*Compt. Rend. Soc. Biol. [Paris], 66 (1909), No. 5, pp. 219–221*).—The author concludes that the presence of specific antibodies in the serum of sheep

infested by gourd worms shows that in these affections there is a chronic poisoning due to substances excreted by the parasites in the liver.

Sheep dips, F. P. SARGEANT (*Pharm. Jour. [London], 4. ser., 28 (1909), No. 2378, pp. 642, 643; abs. in Chem. Zentbl., 1909, II, No. 3, p. 231*).—The author discusses the various chemicals used to combat the parasites of the sheep fleece. The different formulas and most efficient chemicals are enumerated.

Recent work of the Bureau of Animal Industry concerning the cause and prevention of hog cholera, M. DORSET (*U. S. Dept. Agr. Yearbook 1908, pp. 321–332*).—An account is given of hog cholera and of the methods of immunizing hogs against the disease as worked out by this Department.

Hog-cholera serum (*Michigan Sta. Circ. 6, pp. 4, figs. 2*).—Directions are given for the use of hog-cholera serum which is now being manufactured at the bacteriological laboratory. The serum-simultaneous method is not recommended at present, but the serum-alone method is strongly recommended for use where hog cholera exists or in cases where immunity is desired for a short period. A charge of 2 cts. per cubic centimeter is made for the serum, which is said to be below the actual cost for producing and testing it. A contract releasing the laboratory from all responsibility is required of all who use the serum.

Swine fever (*Agr. Gaz. N. S. Wales, 20 (1909), No. 8, pp. 656–669, figs. 8*).—Hog cholera is said to have been known in New South Wales for about 6 years.

Contribution to the knowledge of infectious anemia of horses, J. HEMPEL (*Ztschr. Infektionskrank. u. Hyg. Haustiere, 5 (1909), No. 5, pp. 381–434*).—The author finds the causative agent of this disease to be an ultravisible nonculturable virus. It produces the disease when small quantities are subcutaneously or intravenously injected, but large quantities are necessary to produce it through ingestion. The saliva of an affected animal is not infectious and healthy animals do not contract the disease through the inhalation of the same air nor by eating from the same troughs as the diseased ones. An intermittent fever is the only striking symptom. Recovered animals are not immune to the disease and it is not possible to immunize animals against it. A continued heating for 1 hour at a temperature of 56° C. does not destroy the virus.

Equine infectious anemia, A. T. KINSLEY (*Amer. Vet. Rev., 36 (1909), No. 1, pp. 45–54*).—This paper is based on correspondence with 60 veterinarians practicing in various localities where the disease occurs and on field investigations of about 50 cases in northern Oklahoma and southeastern Kansas.

"The infection, in many instances, seems to remain on a farm or in a barn indefinitely. It is usually not readily carried to adjacent farms or other barns. A farm near Coffeyville, Kans., has been infected for 12 or 14 years, and the owner has lost horses with this disease nearly every year during that time, while a neighbor living not more than 60 rods diagonally across a thoroughfare has never had a case."

Horses and mules were found to be about equally susceptible to the disease, while age and breed appear to have little influence over susceptibility. Food seems to have no causal relation to the disease, as it affects as many horses that are constantly fed on dry food as those which run in pastures. The disease occurs regardless of the source of water.

"The initial attack of this disease usually occurs during July, August, and September, though many cases have been observed both earlier and later than this. The disease is most prevalent in the summer months; however, chronic cases may be seen in midwinter. The disease is more prevalent during wet seasons and is equally prevalent on uplands and lowlands. The disease may appear suddenly or it may have an insidious onset." The symptoms of the disease are discussed at some length, and post-mortem examinations reported upon.

"The most characteristic microscopic lesions were found in the blood. The hemoglobin content, which according to the Tallquist scale ranges from 90 to 100

per cent in normal equines, varied from 10 to 85 per cent in the affected animals. The red blood corpuscles varied from 1,006,400 to 6,800,000 per cubic millimeter. The red blood corpuscles very in size, there being some very small (mycrocytes) and some excessively large (megalocytes); they are also variable in shape (poikilocytes); and occasionally a nucleated cell (erythroblast) is observed. The changes occurring in the white blood corpuscles are somewhat variable. The one principal change is the increased proportion of polymorphs."

The results of blood examinations of 35 affected horses are reported in tabular form.

Conjunctivitis diphtherica, BEUGE (*Ztschr. Veterinärk., 20 (1908), No. 8–9, pp. 369, 370; abs. in Vet. Rec., 21 (1909), No. 1086, p. 746*).—The author records a case of catarrh of the conjunctiva of one eye in a gelding. The case was treated with a 2 per cent solution of nitrate of silver and the severe symptoms, which were probably infectious in origin, subsided in 10 days.

Glanders, L. VAN ES (*North Dakota Sta. Bul. 85, pp. 29–75, pls. 5*).—This is a summary of the knowledge concerning glanders and its prevention. Most of the cases in North Dakota occur in counties having the greatest influx of settlers and in those where railroad construction work has been most recent.

A new subcutaneous mycosis of equines, CAROUGEAU (*Jour. Méd. Vét. et Zootech., 60 (1909), Jan., pp. 8–22; Feb., pp. 75–90; Mar., pp. 148–153*).—The author describes a mycosis of the subcutaneous connective tissue which occurs in the horse and mule and may offer some resemblance to epizootic lymphangitis, ulcerative lymphangitis, and farcy.

Clinically the affection is characterized by small nodules or multiple subcutaneous abscesses. It is caused by a filamentous fungus which seems to be a Sporotrichum. The disease can be reproduced experimentally by the inoculation of pure cultures of this fungus. Recovery takes place under the influence of potassium iodid which exercises a specific action upon the parasite. The author has designated the affection as sporotrichosis of horses.

Filariasis of the tendons of the horse, DROUET (*Rev. Gén. Méd. Vét., 12 (1908), No. 142, pp. 553–568, figs. 3*).—This affection, caused by *Filaria reticulata*, occurs very frequently in horses of the lower Rhone region. The majority of the cases are not grave and the affection has no marked influence on the use of the animal. It does, however, sometimes produce chronic lesions and more or less directly causes tendonous distensions. There is no prophylactic or therapeutic treatment to be recommended.

Filariasis of the suspensory ligament of the pastern joint in the horse, SCHNEIDER, FAYET, and MOREAU (*Rev. Gén. Méd. Vét., 13 (1909), No. 145, pp. 1–10, figs. 4*).—The symptoms and pathological anatomy of this affection are here considered at some length.

The treatment of traumatic arthritis, URBAIN (*Jour. Méd. Vét. et Zootech., 60 (1909), May, pp. 257–260, fig. 1; abs. in Vet. Rec., 22 (1909), No. 1104, p. 157*).—The author records the successful treatment of 2 cases (10-year-old horses) of traumatic arthritis.

Worm tumors in the stomach of the horse, M. HENRY (*Agr. Gaz. N. S. Wales, 20 (1909), No. 7, pp. 579, 580, fig. 1*).—The small thread-like white worms (*Spiroptera megastoma*), which cause these tumors by burrowing under the mucous membrane of the stomach, are said to be widely distributed in New South Wales.

The painless destruction of dogs, H. JAKOB (*München. Tierärztl. Wchnschr., 53 (1909), No. 8, pp. 137–141; abs. in Vet. Rec., 22 (1909), No. 1105, p. 170*).—The author recommends the combined use of veronal and chloroform as a quiet and painless method of destroying dogs. The dogs are first thrown into a deep sleep by a large dose of veronal and are then destroyed by chloroform. The dose of veronal is 2½ to 4 gm. given by the mouth or rectum. This drug requires

at least half an hour after administration before deep sleep is produced, but the sleep is then maintained up to 6 hours.

Further investigation upon white diarrhea of chicks, P. B. HADLEY and W. F. KIRKPATRICK (*Successful Poultry Jour., 14 (1909), No. 4, pp. 18, 19*).—A paper read at the meeting of the International Association of Intstructors and Investigators of Poultry Husbandry, at Guelph, Canada, in which the authors report upon experiments conducted at the Rhode Island Station (E. S. R., 21, p. 387). The following are the conclusions drawn:

"The first evident fact is that *Coccidium cuniculi*, the cause of blackhead in turkeys, does, when fed experimentally in pure culture to young chicks 2 days old, cause a severe, and in every case fatal, disease, which is in all respects similar to the affection known by poultrymen as white diarrhea.

"The second fact to be noted is, that the *Bacterium pullorum*, alleged by Rettger to be the cause of white diarrhea, when fed by means of bouillon cultures to young chicks 2 days old, did not in any instance produce any disease nor any manifestation of white diarrhea.

"The third fact to be observed, and the most important one of all, is that by the use of sterilized food, sterilized water, and aseptic conditions in the brooders, the presence of white diarrhea or of any other intestinal disease was absolutely prevented."

The dissection of fowls, F. C. HARRISON (*Rel. Poultry Jour., 16 (1909), No. 4, pp. 466, 467, figs. 2*).—Instructions are given for the dissection of fowls and the recognition of abnormal conditions.

The practical study of malaria and other blood parasites, J. W. W. STEPHENS and S. R. CHRISTOPHERS (*London, 1908, 3. ed., pp. IV+414+XIV, pls. 6, figs. 128*).—A third revised and enlarged edition of this work (E. S. R., 15, p. 983). The pathogenic trypanosomes, Hæmamœbidæ, and spirochetes are described more at length than in the earlier edition. The chapters on the ticks have been rewritten and much extended.

Report on the prevention of malaria in Mauritius, R. Ross (*London, 1909, pp. XVI+202, pls. 14, map 1; rev. in Lancet [London], 1909, II, No. 1, pp. 22; Bul. Inst. Pasteur, 7 (1909), No. 3, pp. 134, 135*).—The author, who spent 3 months on the island investigating the problem, is of the opinion that in all likelihood malaria was not endemic in the colony before 1865. The particular mosquito responsible for transmitting the disease in Mauritius is *Pyretophorus costalis*, which was probably brought to this island by some vessel.

Notes on some Australian parasites, T. H. JOHNSTON (*Agr. Gaz. N. S. Wales, 20 (1909), No. 7, pp. 581–584*).—This is a brief account of the entozoa infesting human beings and live stock in Australia.

The intestinal worms of three hundred and eighty-five Filipino women and children in Manila, P. E. GARRISON and R. LLAMAS (*Philippine Jour. Sci., B. Med. Sci., 4 (1909), No. 3, pp. 185, 186*).—A comparison of the frequency of these parasites in men from all over the islands and women and children in Manila is shown in the following table:

Frequency of parasites.

Animal parasites.	Men.	Women.	Children.
	Per cent.	*Per cent.*	*Per cent.*
Trichuris	59.00	84.00	92.00
Ascaris	26.00	51.00	56.00
Hookworms	52.00	15.00	11.00
Strongyloides	3.00	0	0
Oxyuris	.80	0	1.33
Tænia	.70	0	.66
Hymenolepis	.10	0	0

Observations on the division of spirochetes, DORIS L. MACKINNON (*Parasitology, 2 (1909), No. 3, pp. 267–280, figs. 2*).—The author is inclined to the opinion that both longitudinal and transverse divisions take place in the spirochetes, the latter form being the more common.

A critical review of our present knowledge of the hæmoflagellates and allied forms, W. S. PATTON (*Parasitology, 2 (1909), No. 1–2, pp. 91–143*).—An extensive bibliography accompanies this account.

RURAL ENGINEERING.

The small irrigation pumping plant, B. P. FLEMING (*New Mexico Sta. Bul. 71, pp. 3–75, figs. 18, dgms. 4*).—Most of the water supply of the Territory of New Mexico available from streams is covered by existing rights, leaving agricultural extension in the Territory very largely dependent upon either the storage of storm waters or pumping with underground waters.

This bulletin is prepared especially for homeseekers who must depend upon pumping to secure a water supply for irrigation, and covers practically all of the points which would occur to one who is contemplating the establishment of a pumping plant in New Mexico. It discusses the occurrence of ground waters, the sinking of wells, including methods, machinery, casings, and strainers; the types of pumps adapted to lifting water for irrigation under New Mexico conditions; types of engines and motors; and the construction of reservoirs. Most of the points are illustrated by drawings. Tables are included showing the profitable limit of lifting for several crops with various fuels at different prices, and charts depicting the same facts are also given.

Decreasing the consumption of fuel and lumber, A. JOACHIMSSON (*Östergötlands Läns Hushåll. Sällsk. Handl., 1909, No. 3, pp. 34, figs. 19*).—The pamphlet deals with measures for decreasing the domestic consumption of fuel, peat, and lumber, for fencing, building purposes, etc., and shows how other materials, especially cement, may be substituted for wood.

Cement silos in Michigan, J. A. JEFFERY (*Michigan Sta. Bul. 255, pp. 63–92, figs. 29*).—This bulletin discusses the principles of silo construction, and gives data on methods of building and material used in the erection of some successful cement silos in Michigan. Some suggestions are also offered on stave silos, and attention is called to the waste of silage which often occurs because silos are not properly filled.

A number of solid cement wall silos are described which cost from $202 to $250. For their construction either wooden, iron, or steel forms may be used. Details are given for constructing several types of cement block silos costing from $150 up. One of these, 28 ft. high and 16½ ft. in diameter, required 700 blocks. It is said that 3 men can make about 100 blocks per day. One type of hollow wall cement silo is made so by the use of drain tile in addition to the cement block. It is thought by some that silage is more liable to freeze in the hollow than in the solid wall silo. For reenforcing these silos the most common materials used are either wire cables or barbed wire built into the wall about 18 in. apart. In some cases 2-in. band iron hoops are built on the outside, as in the case of the stave silo.

At the present time the cement block silo is more popular than the solid wall cement silo because the work of constructing the cement block silo seems to be more attractive, and the expense and labor entailed in building forms for a solid cement wall are considerably greater than in building the form for making cement blocks. When forms are built for a single solid wall this difference in expense is magnified. This observation does not hold where the professional silo builder is employed.

Labor saving devices in farm buildings, V. JONSSON (*K. Landtbr. Akad. Handl. och Tidskr., 48 (1909), No. 1, pp. 3–32, figs. 26*).—An illustrated article

showing methods of construction of, and labor saving devices in, barns, cow and horse stables, and hog houses. Many of the suggestions made were prompted by a study of farm architecture in the United States, made by the author during 1907.

RURAL ECONOMICS.

The wastes of the farm, A. F. Woods (*U. S. Dept. Agr. Yearbook 1908, pp. 195–216*).—This article points out the great economic losses which occur on farms in the United States as a result of a lack of up-to-date tools and machinery, the inefficient application of labor, the over-cropping and insufficient fertilization of the lands, improper location of wells, the failure to grow garden crops for home consumption, lack of system in crop rotations and farm management, the purchase of cheap and poor seed, failure to control diseases and insect enemies of crops, careless marketing of products, and numerous other sources of waste.

While in many instances the loss to individual farmers from some or all of these causes may not be very great, it annually amounts to many millions of dollars, thus reducing the profits to the farmer and increasing the price of products to consumers. It is believed that under a system of scientific farm management these losses will be largely reduced in the future.

"For the past ten years there has been apparent to all interested in agricultural production a rapidly increasing interest in improved methods all along the line. There is a strong demand for men better trained in the business and art of farming and farm management. The methods of the men who have made a success of farming are being studied. The improvement of soil and the use of fertilizers are now problems of interest to most farmers in all parts of the country. Higher-bred crops and animals now interest the many instead of the few. The control of diseases of plants and animals is receiving more general and intelligent consideration. Better marketing methods, the improvement of farm sanitation and home conditions and life in general on the farm and its relation to the general welfare are uppermost in the minds of a rapidly increasing number, not only of farmers, but of the public generally. The wonderful progress made on American farms in the last century is but the beginning of a much greater development in this new century."

The business side of farming. Farm records, J. A. Bexell (*Corvallis, Oreg., 1909, pp. 71*).—This is part 1 of a manual to be used as a text-book devoted to the business side of farming, the remaining parts dealing respectively with rural law and rural economics. This part illustrates and describes the single and double entry systems of keeping farm accounts, with practice work in both forms.

Farm accounts, J. O. Peet (*Jour. Bd. Agr. [London], 16 (1909), No. 6, pp. 453–463*).—This article discusses and illustrates the advantages of keeping farm accounts, what books to keep, when and how to commence farm accounts, and profit or loss in various departments.

Types of farming in the United States, W. J. Spillman (*U. S. Dept. Agr. Yearbook 1908, pp. 351–366*).—The various types of farming carried on in this country are outlined in this article to meet the needs of city toilers and others unacquainted with the rudiments of the industry who desire to take up farming as a business.

The article sets forth the systems of farm management practiced under general conditions in various parts of the country and on the different classes of farms mentioned, and points out the conditions under which success or failure is likely to result. Before undertaking to farm the beginner is urged to study the literature of the various types of farming. In a comparison of farming with other industries the conclusion is drawn that "the intelligent farmer pro-

duces a large part of his living on the farm, thus rendering the expense of living in the country much less than in the city. It should be further remembered that the independence of farm life goes far toward balancing its disadvantages when compared with city life; nor should it be forgotten that the farmer requires both experience and at least a rudimentary knowledge of several sciences in order to attain the best success. It is only recently that farming has profited by the discoveries of the scientist, and even yet there is much to learn, especially about the soil. There is growing up, however, a science of farming, and in so far as this science has been reduced to rule, it takes the place of experience to a certain extent. A diligent study of agricultural literature, therefore, may enable the beginner to be successful with comparatively little experience."

Profitable farming in New England (*Boston Evening Transcript, 1909, Oct. 23, pt. 3, p. 2*).—Statistics of profitable farming in such branches of the agricultural industry as vegetables and flowers, fruits, potatoes, corn, sheep, poultry, dairy products, pigs, hay, etc., are presented and discussed. The article indicates what can be done on the so-called "abandoned farm" lands of some of the New England States.

Causes of southern rural conditions and the small farm as an important remedy, S. A. KNAPP (*U. S. Dept. Agr. Yearbook 1908, pp. 311–320*).—Notwithstanding a favorable climate, fertile soils, satisfactory rainfall, and valuable natural resources in the South Atlantic and South Central States, this article shows that the South has thus far failed to produce the results in wealth production and economic progress which its natural conditions seem to justify.

This deficiency in progress is traced to four main economic errors, viz, compulsory labor by another race, adoption of a one-crop system of farming, the establishment of large plantations in the South, and failure to utilize the wealth of minerals, timbers, and other natural resources in building up "a commonwealth that would furnish markets as well as raw material and thus in a measure become self-sustaining and independent." Other causes of decline mentioned are lack of transportation facilities, poor roads, and scarcity of money and labor.

The breaking up of large plantations into small farms, each owned and operated by one family, is regarded as essential to the establishment of permanent prosperity in the South. "The area must not be so large that the income will support the owner without effort on his part, nor should it be so small that it will make a mere toiler out of the owner, for this narrows the intellect. It should be large enough to provide good farm equipment, buildings, machinery, and stock and furnish labor for the family. The annual income must be sufficient to improve the farm, educate the family, assist in starting its members in ways of independent support, and provide a reserve for old age. The United States has fixed that area in some States at 160 acres. The right acreage of the farm depends upon conditions. In semiarid sections it may require more than double that number of acres, while near large cities less than one-fourth may answer the purpose."

The small farm is regarded as a means of increasing the dignity of rural life, as an excellent training ground for young men, and as a means of encouraging thrift and conservatism in farmers. In the author's opinion, the national government should see that rural districts are served at a freight charge based on the cost of service performed. The framing of a law "by which the farmer may participate in the use of an equitable portion of the vast time deposits of the people's money at a moderate rate of interest and upon such securities as he possesses," is also advocated as a means of promoting the establishment of prosperous rural homes in the South.

Regarding rural depopulation (*Jour. Agr. Prat., n. ser., 18 (1909), No. 33, pp. 250, 251*).—The chief causes of rural depopulation in France are believed to be the system of training young farm people for commercial and professional careers rather than for farm life and the small size of French peasant families at the present time. The result has been a scarcity of farm help.

To meet this condition the employment of more farm machinery, the instruction of farm laborers in its use, the improvement of the economic and social status of the laborers, the employment of married people on the farm, the extension of the metayer system, and the practical training of young rural people to the particular lines of agricultural industry followed in different sections of the country are advocated.

The utilization of agricultural land in Denmark, M. Koefoed (*Statis. Tabelværk [Denmark], 5. ser., 1909, Litra C, No. 3, pp. 52+179*).—The statistics given in this report cover data relating to the utilization of agricultural land in Denmark for small grains, root and miscellaneous crops, fallow, green-manuring and soiling crops, and pastures, during the years 1896–1907, inclusive, with the decrease or increase in area in each case. Statistics for the individual crops and changes in the area occupied by these for the periods given, the area marled and drained, and the amounts of seed used are also reported.

Agricultural cooperative societies in Denmark, P. Fourrier (*Jour. Agr. Prat., n. ser., 18 (1909), No. 38, pp. 400–402*).—The returns of cooperative dairies, slaughterhouses, and egg-collecting societies have been previously noted (E. S. R., 20, p. 794). The cooperative societies for the purchase of supplies numbered 973 with 160,000 members, and the "control associations," which aim to secure the best results in the raising of highly-productive cows, numbered 450, with more than 10,000 members, owning 169,000 cows.

Cooperative banking without money and cooperative credit unions (*Farm and Home [Mass.], 30 (1909), Nos. 631, p. 523; 633, pp. 574, 583*).—These articles describe the operation and principles of mutual credit unions or banks in Europe, give a brief account of their history and development in America, and point out the particular advantages of the agricultural cooperative credit union to farmers as follows:

(1) It enables worthy borrowers to escape from the bondage of the loan sharks; (2) it enables a great body of honest and industrious citizens to establish their personal credit, as yet unrecognized by existing banks; (3) it gives an opportunity to farmers, or to beginners at farming, to obtain the first small capital with which to begin business on their own account; (4) it encourages saving among numbers of people whom the savings banks never reach; and (5) it proves to be a creative, educating, and moral tendency in any community in which it is successfully established.

National congress of agricultural credit, H. Sagnier (*Jour. Agr. Prat., n. ser., 18 (1909), No. 36, pp. 341–344; Indus. Lait. [Paris], 34 (1909), No. 38, pp. 724–730*).—This is a summarized account of the third congress held at Montpellier, September 1–4, 1909.

The discussions and resolutions related to the establishment and extension of different forms of mutual insurance and credit in France and the modification of existing laws with reference to the organization, operation, and functions of agricultural associations. The courts had decided that agricultural associations did not come under the head of coöperative societies and could not carry on their functions under the laws relating to the latter, but the congress demanded that laws be passed permitting the agricultural associations to furnish to their members all the materials and machinery necessary for the exploitation of the land.

AGRICULTURAL EDUCATION.

Annual report on the distribution of grants for agricultural education and research, 1907–8 (*Bd. Agr. and Fisheries [London], Ann. Rpt. Agr. Ed. and Research, 1907–8, pp. XLII+161*).—According to this report the grants awarded by the Board of Agriculture and Fisheries for agricultural instruction in England and Wales in 1907–8 amounted to $58,685. This is an increase of $2,668 over the previous year, due to grants of $1,455 to the University of Oxford for a department of rural economy, and of $1,213 to the University of Cambridge for a school of forestry. There were also special grants for experimentation and research amounting to $1,843, making a total of $60,528.

The total attendance at the subsidized institutions has increased from 1,221 in 1906–7 to 1,313 in 1907–8, not counting 236 students attending the Royal Veterinary College nor 300 elementary school teachers who attended short courses at the colleges during the year. It is estimated that every year 10,000 young men in England and Wales should receive agricultural instruction in some form, while as a matter of fact less than 7 per cent of the registered college students are actually receiving such instruction. In these estimates no account has been taken of market gardeners and others occupying holdings of less than 5 acres, nor of the bailiffs, shepherds, laborers, and others belonging to the agricultural and industrial classes for whom instruction in the manual processes of agriculture, poultry keeping, cottage gardening and bee keeping is now provided by local authorities.

In an endeavor to estimate the direct expenditure for agricultural education, it is shown that with the exception of the grants earned for classes in the principles of agriculture from the Science and Art Department, all the state aid available for technical instruction in agriculture was, until 1902, given by the Board of Agriculture. These grants increased gradually from $7,905 in 1888–9 to $58,685 in 1907–8. After the Education Act of 1902 came in force the Board of Education grants to local authorities for the purposes of higher education became applicable to agricultural instruction, but apparently no substantial sum was applied to agricultural purposes until the board introduced the new "block grant" regulations in 1906. In a memorandum recently published by the Board of Education, it was estimated that $37,767 was disbursed in 1907–8 for "specialized agricultural technology." Of this amount $6,445 was paid to 7 agricultural institutions and the remainder to county education committees for local work. It is estimated that in 1905–6, out of a total of 5,728 evening schools receiving grants of $1,682,950, only 248 earned grants for agricultural work.

The report shows that the total annual cost of agricultural education in England and Wales during the past 9 years has varied from $412,250 in 1899–1900 to $475,300 in 1903 4, and that the net average expenditure for agricultural education in 1906–7 and 1907–8 was actually about $50,000 less than in 1901–2 and 1902–3.

A table is given showing by counties the male population engaged in agriculture, average sums spent on agricultural education, percentage of males engaged in agriculture, percentage of residue grant spent on agriculture, and expenditure on agricultural education per 1,000 male agriculturists. These figures indicate that "among English and Welsh counties, for example, there are 4 in which more than 40 per cent of the whole male population over 10 years of age is engaged in agriculture, but these 4 counties spend on the average less than 5 per cent of their 'whiskey money' in promoting agricultural education; this works out at less than $53 per 1,000 agriculturists. In contrast there are the 4 counties which (excluding Middlesex) have the smallest agricultural

population (less than 7 per cent of the total number of males). These counties give on an average 15 per cent of their 'whiskey money' for agricultural education, or about $713 per 1,000 agriculturists."

"In general terms it may be stated that partly because they are rich, partly because the industrial classes were quicker to appreciate the value of technical instruction, and thus set an example for their agricultural neighbors, and in not a few cases because of the action in the earlier years of capable officials, the industrial counties now possess organized systems of instruction in agriculture, while agricultural education in the agricultural counties is, with a few marked exceptions in the west of England, in a very unsatisfactory state."

The supply and training of teachers and their salaries, the education of the farmer, the need for special instructors for local work, the local administration of agricultural education, and the special claim of agricultural education to State assistance are discussed. There are also 2 appendixes, the first giving detailed reports on the institutions receiving grants from the Board of Agriculture and Fisheries in 1907–8 and on agricultural instruction provided by county councils in 1907–8, and the second giving reports and resolutions on agricultural education adopted by different rural and agricultural organizations.

The Illinois College of Agriculture: Something concerning its early struggles and ideals, A. S. DRAPER (*Goodall's Farmer, 37 (1909), No. 42, pt. 2, p. 1, fig. 1*).—A brief sketch of the development of the Illinois College of Agriculture since the beginning of the author's administration as president of the university.

The place and function of agriculture in the curriculum, W. R. HART (*Nature-Study Rev., 5 (1909), No. 6, pp. 161–164*).—The author begins by pointing out the fact that the utility of a study depends entirely upon the student's point of view and purpose. Thus, Latin is more utilitarian than science if it is studied with a view to the better understanding of scientific terms and the latter subject is pursued merely for cultural purposes. Agriculture is unique in the fact that it may serve as the introduction to so many of its component sciences while holding a large content of practical and cultural value on its own account. "No other study has ever engaged the attention of scholars which has so many different elements or aspects." Such considerations lead the author to conclude that the place and function of agriculture in the school curriculum is threefold: "(1) It furnishes a good body of material which may be used as a point of departure for the study of other sciences, (2) it contains much material identical with good material in other sciences, and (3) it also opens a vast field for the application of the laws of other sciences."

A course of study in nature study: Part I. Grades I, II, III and IV, F. L. CHARLES (*Bul. North. Ill. State Normal School, DeKalb, 6 (1909), No. 4, pp. 40*).—This is a well-elaborated arrangement of nature-study work by grades and seasons based upon several years' experience in the training-school course of the Northern Illinois State Normal School. It is introduced by a set of nature-study maxims which emphasize the principles on which it is based.

Report of the work of the School Garden Society, 1907 and 1908, C. MARIBO (*Haven, 9 (1909), extra No., pp. 169–184*).—This third report of the society contains a brief history of each of the 27 school gardens established since the publication of its previous report in 1907, with information as to attendance, methods of instruction, facilities, etc. The total number of school gardens in existence in Denmark in 1908 was about 40.

Bringing nature back to the city, A. SUTHERLAND (*South. Workman, 38 (1909), No. 10, pp. 529–535, figs. 5*).—A description of the work of the Vacant Lots Cultivation Association of Philadelphia, including the new feature of the year, the formation of boys' clubs.

MISCELLANEOUS.

Yearbook of the Department of Agriculture, 1908 (*U. S. Dept. Agr. Yearbook 1908, pp. 822, pls. 55, figs. 29*).—The Yearbook for 1908 contains a report by the Secretary on the work of the Department during the year, 23 special articles abstracted elsewhere in this issue, and an appendix consisting of the usual agricultural directory, a review of weather and crop conditions during the year, the principal injurious insects and plant diseases of the year, progress in food and drug inspection and other chemical work, in forestry, and in game protection, soil areas surveyed and mapped, road laws enacted in 1908, and agricultural statistics.

Annual Report of Alaska Agricultural Experiment Stations, 1908 (*Alaska Stas. Rpt. 1908, pp. 80*).—This contains a report of the chief lines of work carried on during the fiscal year ended June 30, 1908, at the Sitka, Rampart, Fairbanks, Copper Center, and Kodiak stations, an account of the closing of the Kenai Station, brief notes on the maturing of melons and other vegetables at Hot Springs Farm, and on live stock operations at a ranch at Kodiak, a list of plants collected in Alaska during 1908 by C. W. H. Heideman, and reports from the seed distribution. Meteorological data and accounts of the extensive tests with field and garden crops and of the live stock operations are abstracted elsewhere in this issue.

Thirty-first and Thirty-second Annual Reports of Connecticut State Station, 1907–8 (*Connecticut State Sta. Rpt. 1907–8, pt. 12, pp. XXIV*).—These pages include the organization list, a report of the board of control, in which are embodied resolutions adopted regarding the life and work of the late W. O. Atwater and E. H. Hoyt, former members of the board, a financial statement for the fiscal years ended September 30, 1907, and September 30, 1908, and a list of corrections and additions to the report.

Nineteenth and Twentieth Annual Reports of New Hampshire Station, 1907–8 (*New Hampshire Sta. Rpts. 1907–8, pp. 246–680+III*).—This contains the organization list; a report of the director for the biennial period ended October 31, 1908; financial statements for the fiscal years ended June 30, 1907, and June 30, 1908; departmental reports, the experimental work of which is abstracted elsewhere in this issue; brief notes on sheep breeding experiments for early lamb production; a list of insects received for identification; reprints of Press Circulars 1–12, entitled alfalfa for New Hampshire, spraying for the brown-tail moth and orchard caterpillars, early lamb production, low grade cotton-seed meal, herd testing, poultry manure, good grass seed, some points about fertilizers, buying and selling a cow on one test, cotton-seed meal and mixed feed, an outbreak of forest caterpillars, and keeping apples in a cool place; a list of the publications of the station from 1888 to 1908, and an index to these publications.

Suitable paper for permanent records, F. P. Veitch (*U. S. Dept. Agr. Yearbook 1908, pp. 261–266*).—This article, which supplements others previously noted (E. S. R., 20, p. 875; 21, p. 295), enumerates the factors that determine the durability of papers, describes the methods of determining the quality, and discusses the proper care of important publications and records.

Index for Bulletins 69–83 of the North Dakota Station (*North Dakota Sta. Index to Buls. 69–83, pp. 3–11*).—In addition to the index for Bulletins 69–83, inclusive, this contains lists of these bulletins and of the press bulletins and special bulletins published during the same period.

NOTES.

Connecticut State Station.—The construction of the addition recently authorized to the laboratory building has been begun, and it is expected that it will be completed by April 1, 1910.

Georgia Station.—The resignation is noted of C. L. Willoughby, dairyman and animal pathologist, who has gone into commercial lines. The change took effect December 1.

Illinois University and Station.—An addition to the experimental greenhouse, 28 by 222 ft., has been made, this exactly doubling the capacity. Half of the building will be used temporarily for class-room purposes, and the remainder will be utilized for growing cucumbers during the winter and roses during the summer.

Massachusetts Station.—Carl D. Kennedy, a graduate of the New Hampshire College, has been appointed assistant chemist, and has entered upon his duties.

Michigan Station.—A brick annex to the botanical building is under construction. This addition is to be 33 by 61 ft., with 2 stories and basement, and will cost about $13,000. A greenhouse 24 by 40 ft. is also to be erected.

Montana College and Station.—W. J. Elliott, who has been professor of dairying and dairyman for 6 years, has resigned to take effect January 1, 1910, when he will assume charge of a demonstration farm operated by the Canadian Pacific Railway in Alberta, Canada. For the immediate future the dairy work will be organized as a division of the department of animal industry, in charge of an assistant to be engaged.

New Hampshire Station.—W. L. Slate, jr., has been appointed assistant in agronomy.

New Mexico College and Station.—J. D. Tinsley has resigned to take up work with the industrial department of the Santa Fe Railway, beginning January 1, 1910.

Cornell University.—By recent action of the faculty either one-half year or one year of high-school agriculture may be presented for entrance credit in the college of agriculture.

New York State Station.—Stockton M. McMurran has been appointed assistant botanist during the year's leave of absence of G. T. French, who is pursuing postgraduate work at Cornell University. W. J. Schoene, assistant entomologist, is also absent on leave to take up postgraduate work at the University of Chicago.

Virginia Truck Station.—At a recent meeting of the governing board, the title of the superintendent was changed to director. The erection of a tool shed and work room, and of a laboratory building for spraying materials was authorized. Eugene G. Smyth has been appointed assistant in entomology, vice C. H. Popenoe, who is now devoting his entire time to work in the Bureau of Entomology of this Department. J. I. Milstead, assistant in truck crops, has resigned to accept a position with the Bureau of Plant Industry of this Department.

West Virginia University and Station.—A 4 months' leave of absence, beginning November 1, has been granted to W. M. Munson on account of ill health.

Wyoming Station.—Charles J. Oviatt, a 1909 graduate of the Michigan College, has been appointed assistant in wool investigations.

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